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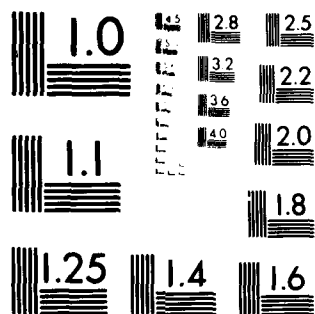
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PHASE I INSPECTION REPORT

NATIONAL DPM INSPECTION PROGRAM



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DEPARTMENT OF THE ARMY

Corps of Engineers

Washington, Maryland 21203

Prepared by
WILLIAM E. BAKER, JR., MSG.

Approved by
[Signature]
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OHIO RIVER BASIN

(P)

PA 483
WASHINGTON COUNTY, COMMONWEALTH OF PENNSYLVANIA
NDI No. PA 01124
PennDER No. 63-75
SCS No. PA 483

(6) PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Ward Run. NDI Number PA-01124 PennDER number
63-75 SCS Number PA-483. Ohio River Basin
Washington County, Pennsylvania.
Phase I Inspection Report,

Prepared for: DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

Prepared by: MICHAEL BAKER, JR., INC.
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(H) July 87

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(15) DACW31-80-C-0025

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PREFACE

This report is prepared under guidance contained in the "Recommended Guidelines for Safety Inspection of Dams," for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

PA 483, Washington County, Pennsylvania
NDI No. PA 01124, PennDER No. 63-75, SCS No. PA 483
Ward Run
Inspected 19 March 1980

ASSESSMENT OF
GENERAL CONDITIONS

PA 483 is a 74 foot high, zoned earthfill floodwater retarding dam designed by the U.S. Department of Agriculture, Soil Conservation Service (SCS). The dam is owned and operated by the Washington County Commissioners. The dam consists of a 360 foot long embankment, a vegetated earth side channel emergency spillway, and an intake riser and outlet conduit (principal spillway). The dam and appurtenant structures were found to be in good overall condition at the time of the inspection.

Hydraulic/hydrologic evaluations, performed in accordance with procedures established by the Baltimore District, U.S. Army Corps of Engineers, for Phase I Inspection Reports, revealed that the spillway will pass the Probable Maximum Flood (PMF) without overtopping the dam. PA 483 is a "High" hazard, "Intermediate" size dam requiring evaluation for a spillway design flood (SDF) equal to the PMF. Therefore, the spillway is assessed as "adequate."

The inspection revealed certain items of remedial work which should be performed immediately by the owner. These include:

- 1) The area on the left abutment where the second slide is developing should be monitored frequently (weekly) and remedial repairs should be performed as soon as possible. It is our opinion that diverting the roadway drainage farther down the road from the dam before it is allowed to drain over the hillside would help prevent the left abutment erosion and increase the stability of the hillside. This could be accomplished by installing and maintaining an earth berm or asphalt curb on the valley (west) side of the township road.
- 2) Remove the soil and debris that is blocking the ripped drain in the junction of the left abutment and downstream embankment.

- 3) Fill the three vertical holes in the downstream embankment.
- 4) Replace the rusted through animal guards on the drains.
- 5) Remove the leaves that have collected on the trash rack on the low-level inlet of the riser.

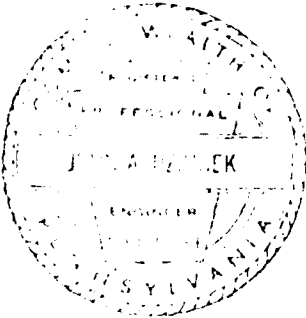
The following items should be added to the maintenance procedures for the dam:

- 1) Periodically monitor the areas of the slide on the left abutment and the slumps on the right hillside to ensure that these conditions do not become serious.
- 2) Check the emergency gate and maintain it in an operable condition.

In addition, the following operational measures are recommended to be undertaken by the owner:

- 1) Develop a detailed emergency operation and warning system.
- 2) During periods of unusually heavy rainfall, provide around-the-clock surveillance of the dam.
- 3) When warning of a storm of major proportions is given by the National Weather Service, the owner should activate the emergency operation and warning system.

PA 483



Submitted by:

MICHAEL BAKER, JR., INC.

John A. Dziubek
John A. Dziubek, P.E.
Engineering Manager-Geotechnical

Date: 10 July 1980

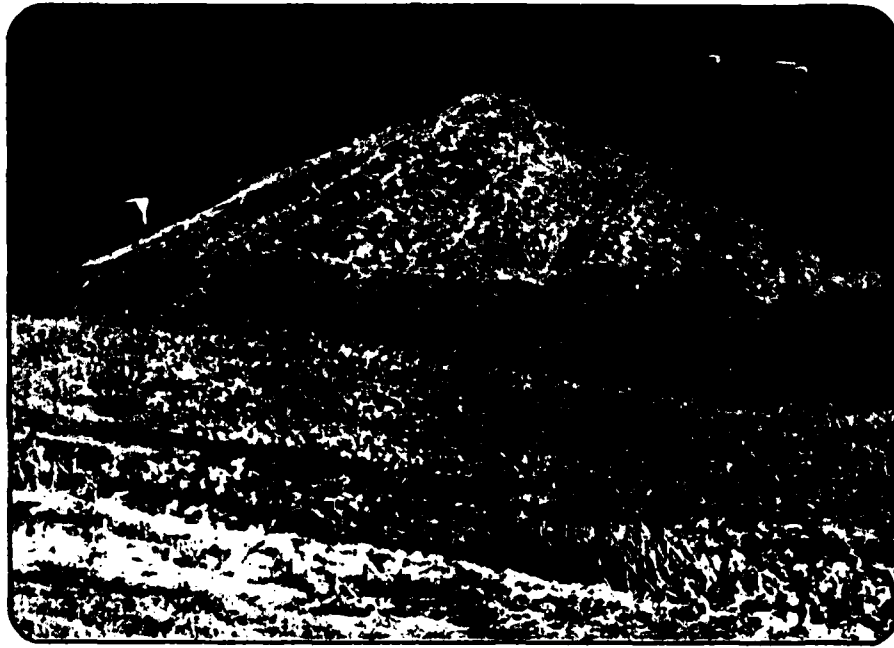
Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

James W. Peck
JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date: 11 August 80

PA 483



Overall View of the Downstream Face of the Dam from the Right Abutment



Overall View of the Upstream Face of the Dam from the Emergency Spillway

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
PA 483

NDI No. PA 01124, PennDER No. 63-75, SCS No. PA 483

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

- a. Authority - The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.
- b. Purpose of Inspection - The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

- a. Description of Dam and Appurtenances - PA 483 was designed by the U.S. Department of Agriculture, Soil Conservation Service (SCS) for floodwater detention. The dam consists of a zoned earth embankment, a vegetated earth emergency spillway, and a riser intake with a 24 inch diameter outlet conduit.

The crest length of the embankment is 360 feet. The maximum height of the dam is 74 feet. The minimum elevation of the dam crest is 1072.1 feet Mean Sea Level (M.S.L.) and the top width is 14 feet. The slope of the upstream face is 3H:1V (Horizontal to Vertical) with a 10 foot wide berm between Elevations 1030.2 and 1031.2 feet M.S.L. The slope of the downstream face is 2.5H:1V with a 15 foot wide berm between Elevations 1044.8 and 1045.3 feet M.S.L.¹

The original drainage system of the dam consisted of a foundation drain trench with granular material and 12 inch diameter perforated metal collector pipes in the valley bottom, and blanket drains of granular material along portions of the junctions

¹The berm on the downstream face of the embankment has a 1 percent slope down towards the left abutment. Elevations listed above correspond to the elevation of the berm on a cross-section taken through the embankment along the centerline of the outlet works.

of the downstream slope with both abutments. When the dam was first placed in service, leaks developed in both abutments. As a result, the following additional drains were installed: drains consisting of 8 inch diameter perforated asbestos cement pipe surrounded by granular material covered with riprap, located just below the surface along the junctions of the downstream slope with both abutments; a toe drain consisting of 8 inch diameter perforated asbestos cement pipe surrounded by granular material; a culvert drain consisting of granular material covered with riprap, located on the left hillside downstream of the dam; 24 horizontal drains of 1.5 inch diameter steel pipe and 1.5 inch diameter perforated PVC pipe, located in the left hillside; and a spoil disposal area drain consisting of an 8 inch diameter asbestos cement pipe surrounded by granular material.

The outlet works (principal spillway in SCS terminology) consist of a two-stage reinforced concrete riser connected to a 24 inch diameter reinforced concrete outlet pipe. The riser unit contains a low-level inlet 20 inches wide and 9 inches high. The crest of the low-level inlet is at Elevation 1030.2 feet M.S.L. (sediment pool level). Two 6 foot long concrete overflow weirs (one on each side of the riser) with their crests at Elevation 1043.1 feet M.S.L. form the upper-level inlet of the riser. The weirs have a 1.0 foot vertical clearance below the soffit of the concrete slab on the top of the riser.

The outlet conduit for the riser is a 24 inch diameter concrete pipe 330.3 feet long which rests on a concrete cradle. Twelve reinforced concrete anti-seep collars are spaced at intervals of 18 to 24 feet along the upstream 230 feet of the conduit. The conduit discharges into a reinforced concrete impact basin at the downstream toe of the embankment.

A vegetated trapezoidal shaped earth spillway (emergency spillway in SCS terminology) is located at the right abutment of the dam. The control section for the channel is at Elevation 1061.3 feet M.S.L. and is 60 feet wide at its base (perpendicular to flow). The side slopes of the spillway are 3H:1V on the left and 1H:1V on the right. The spillway has a total length of 500 feet along its centerline (parallel to the direction of flow).

The reservoir drain consists of a 24 inch diameter reinforced concrete pipe which extends 73 feet upstream into the reservoir from the base of the riser unit. The invert elevation of this pipe at the base of the riser unit is 999.4 feet M.S.L. There is a 24 inch slide gate on the upstream end of the pipe. The controls for this gate are located on the upstream face of the embankment.

- b. Location - PA 483 is located on Ward Run approximately 2.75 miles north of Eldersville, Pennsylvania and 2.0 miles southeast of Paris, Pennsylvania. The dam is located in Hanover Township, Washington County, Pennsylvania. Located approximately 1.8 miles north of the dam is U.S. Route 22 which in this area runs in a southwest to northeast direction. Access to the dam is via a township road (located directly to the east of the dam) from U.S. Route 22. The coordinates of the dam are N 40° 23.3' and W 80° 28.3'.
- c. Size Classification - The maximum height of the dam is 74 feet and the reservoir volume to the design top of dam (Elevation 1071.7 feet M.S.L.) is 523 acre-feet. The dam is therefore in the "Intermediate" size category.
- d. Hazard Classification - There are four houses and four mobile homes in the floodplain between the dam and the confluence of Ward Run and Harmon Creek, approximately 1.5 miles downstream of the dam. In the event of failure of PA 483, it is likely that more than a few lives would be lost and economic losses would be excessive. The dam is therefore considered to be in the "High" hazard category.
- e. Ownership - The dam is owned by the Washington County Commissioners, Courthouse, Washington, Pennsylvania 15301.
- f. Purpose of Dam - The dam is used for floodwater detention.
- g. Design and Construction History - The dam was designed by the SCS under the authority of the Watershed Protection and Flood Prevention Act, Public Law 566, as amended. The dam was constructed by Solomon-Teslovich of Masontown, Pennsylvania from July 1971 to October 1973 (with appropriate winter shut-down periods). When the dam was placed in service, leaks developed in both abutments.

A grout curtain designed by the SCS was placed by the John Grayson Company, Pittsburgh, Pennsylvania, from June 1976 to November 1976. In 1977, the Anjo Construction Company installed SCS designed additions to the dam's drainage system.

- h. Normal Operational Procedures - The spillway and outlet works are uncontrolled. The pool is normally at the level of the low-level inlet of the riser structure, Elevation 1030.2 feet M.S.L. The dam is inspected on a yearly basis according to procedures for SCS dams of this type. Routine maintenance is performed by county personnel.

1.3 PERTINENT DATA

- a. Drainage Area (square miles) - 1.48
- b. Discharge at Dam Site (c.f.s.) -
 - Peak Outflow at -
 - Crest of Riser (El. 1043.1 ft. M.S.L.) - 71.7
 - Crest of Emergency Spillway (El. 1061.3 ft. M.S.L.) - 85.1
 - Design High Water (El. 1071.7 ft. M.S.L.) - 6432
 - Maximum Known Discharge - 75
- c. Elevation (feet above M.S.L.) -
 - Design Top of Dam - 1071.7
 - Maximum Design Pool - 1071.7
 - Emergency Spillway Crest - 1061.3
 - Riser Crest - 1043.1
 - Sediment Pool - 1030.2
 - Streambed at Toe of Dam - 998+
 - Maximum Tailwater - Unknown
- d. Reservoir (feet) -
 - Length of Maximum Pool (El. 1071.7 ft. M.S.L.) - 3330
 - Length of Flood Control Pool (El. 1061.3 ft. M.S.L.) - 2790
 - Length of Sediment Pool (El. 1030.2 ft. M.S.L.) - 1220

e. Storage (acre-feet) -

Sediment Pool (El. 1030.2 ft. M.S.L.) - 34.6²
Flood Control Pool (El. 1061.3 ft. M.S.L.) - 293
Design Top of Dam (El. 1071.7 ft. M.S.L.) - 523

f. Reservoir Surface (acres) -

Design Top of Dam (El. 1071.7 ft. M.S.L.) - 27.9
Emergency Spillway Crest
(El. 1061.3 ft. M.S.L.) - 16.3
Sediment Pool (El. 1030.2 ft. M.S.L.) - 3.7

g. Dam -

Type - Zoned earthfill embankment

Length (feet) - 360

Maximum Height (feet) - 74

Crest Width (feet) - 14

Side Slopes - Upstream - 3H:1V

Downstream - 2.5H:1V

Zoning - The center impervious zone consists of inorganic clays (CL, CH) provided with a cut-off trench. This impervious zone is surrounded by a zone consisting of clayey gravels and well-graded gravels (GC, GW). Downstream of the berm on the downstream side of the embankment there is a third zone, consisting of sandstone excavated from the emergency spillway and oversized material raked from the first two zones. This third zone was also placed on the upstream side of the embankment, extending from slightly above the berm to the toe of the embankment (see Plate 4 for details).

Cut-off - Compacted earth with base width of 12 feet in foundation and lower abutments.

Drains - Foundation drain trench with granular material and 12 inch diameter perforated metal collector pipes in valley bottom; blanket drains of granular material along portions of the junctions of the downstream slope with both abutments; drains consisting of 8 inch diameter perforated asbestos cement pipe surrounded by granular materials covered with riprap, located just below the surface along the junctions of the down-

²This volume is reserved for a 50-year accumulation of sediment. It is not included in floodwater storage computations.

stream slope with both abutments; a toe drain consisting of 8 inch diameter perforated asbestos cement pipe surrounded by granular materials; a culvert drain consisting of granular material covered with riprap, located on the left hillside downstream of the dam; 24 horizontal drains of 1.5 inch diameter steel pipe and 1.5 inch diameter perforated PVC pipe in the left hillside; and a spoil disposal area drain consisting of an 8 inch diameter asbestos cement pipe surrounded by granular material.

Grout Curtain - A grout curtain was added to the dam after its initial construction. The main portion of this curtain was installed along the centerline of the crest of the embankment from SCS Station 9+60 to Station 2+20³ (see Plate 11 for grouting plan). This corresponds to a point above the roadway on the left abutment to the right abutment above the emergency spillway. Work for this grout curtain also included grouting on the upstream and downstream sides of the embankment.

- h. Diversion and Regulating Tunnel - None
- i. Spillway (Emergency Spillway) -
 - Type - Vegetated earth channel in right abutment
 - Length (feet along centerline) - 500
 - Bottom Width (feet) - 60
 - Side Slopes - Right Side - 1H:1V
 - Left Side - 3H:1V
 - Crest Elevation (feet M.S.L.) - 1061.3
 - Gates - None
 - Downstream Channel - Spillway exits into natural stream channel approximately 15 feet wide.
- j. Regulating Outlets (Principal Spillway) -
 - Type - Two-stage inlet riser connected to a 24 inch diameter reinforced concrete outlet pipe.

³The SCS stationing shown on the plate included in Appendix E differs from that shown on the field sketch prepared during the inspection. Unless specific reference is made to SCS stations, stations used in this report refer to the stationing shown on the field sketch and top of dam profile in Appendix A.

Low-Level Inlet -
 Crest Elevation (feet M.S.L.) - 1030.2
 Width (feet) - 1.67
 Vertical Clearance (feet) - 0.75
 Upper-Level Inlet -
 Crest Elevation (feet M.S.L.) - 1043.1
 Width (feet) - 2 each at 6.0
 Vertical Clearance (feet) - 1.0
 Outlet Conduit - Consists of a 24 inch diameter reinforced concrete pipe approximately 330 feet long. The pipe rests on a concrete cradle and is fitted with 12 concrete anti-seep collars at intervals of 18 to 24 feet.
 Riser Floor Invert Elevation (feet M.S.L.) - 998.6
 Outlet Conduit Exit Invert Elevation (feet M.S.L.) - 997.6
 Reservoir Drain - The reservoir drain consists of a 24 inch diameter reinforced concrete pipe which extends 73 feet upstream into the reservoir from the base of the riser unit. The invert elevation of this pipe at the base of the riser unit is 999.4 feet M.S.L. There is a 24 inch slide gate on the upstream end of the pipe. The gate is operated by a hand crank located on the upstream face of the embankment.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

Floodwater Retarding Dam PA 483 was designed by the SCS according to its standard practice for structures of this type, circa 1965. Design data reviewed included:

- 1) SCS Design Folder and Drawings No. PA-483-P, "Harmon Creek Watershed Project, Floodwater Retarding Dam PA-483, Washington County, Pennsylvania." Design drawings are available in the Pennsylvania Department of Environmental Resources' (PennDER) files. "As built" drawings are available in the SCS Harrisburg office and the Washington County Conservation District office.
- 2) SCS Design Folder and Drawings No. PA-483, "Harmon Creek Watershed Project, Floodwater Retarding Dam PA-483, Washington County, Pennsylvania - Grouting Contract."
- 3) SCS Drawings No. PA-483, "Harmon Creek Watershed Project, Floodwater Retarding Dam PA-483, Washington County, Pennsylvania - Drainage Contract."
- 4) Dam Permit Application Report prepared by the Pennsylvania Department of Forests and Waters (predecessor of PennDER) on 20 May 1971.
- 5) The "Erosion and Sediment Control Plan" for Harmon Creek Watershed, Site PA-382," March 1976, prepared by the SCS.

2.2 CONSTRUCTION

Readily available information on the construction of this dam was reviewed in connection with this Phase I Investigation. This information consisted of PennDER File No. 63-75 for this dam. During construction of the dam, the SCS provided full-time inspection. The inspection reports on construction progress are included in PennDER's file, along with photos taken during construction.

2.3 OPERATION

The pond is typically maintained by the low-level inlet of the riser structure, Elevation 1030.2 feet M.S.L. Washington County and SCS personnel inspect the dam each year according to the procedures for annual inspections of SCS dams of this type.

2.4 EVALUATION

- a. Availability - The information reviewed consisted of PennDER's file on the dam and information provided by the SCS.
- b. Adequacy - The information available is adequate for a Phase I Inspection of this dam.
- c. Validity - There is no reason at the present time to doubt the validity of the available information.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

- a. General - The dam and its appurtenant structures were found to be in good overall condition at the time of the inspection. Noteworthy deficiencies observed are described briefly in the following paragraphs. The complete visual inspection check list, field sketch, top of dam profile, and typical cross-section are given in Appendix A.
- b. Dam - The following is a list of obvious deficiencies noted during the visual inspection of the embankment and abutments:
 - 1) There are three 18 inch⁴ diameter vertical holes on the downstream side of the embankment, the locations of which correspond to grout holes shown on plate 11. These holes are probably unfilled grout holes. The surface around the holes may have eroded and sloughed into the opening to create the relatively large holes observed at the surface. As a result of the holes caving in, the exact depths could not be determined.
 - 2) There has been a large slide on the left abutment downstream of the berm on the downstream embankment. Soil and debris from this slide is blocking the riprapped drain in the junction of the left abutment and downstream embankment.
 - 3) An additional slide is developing on the left abutment immediately downstream of the previous slide.
 - 4) There have been two separate, fairly large slumps on the right hillside above the emergency spillway. This hillside is very wet, with scattered pools of standing water on the benches.
- c. Appurtenant Structures - The following is a list of obvious deficiencies noted during the visual inspection of the appurtenant structures:
 - 1) The animal guards on the drain outlets have rusted through.

⁴Measured at the embankment surface.

- 2) The trash rack on the low-level inlet of the riser is partially clogged with debris.
 - 3) The emergency gate has never been operated.
 - 4) The bottom of the emergency spillway is very wet, with shallow pools of standing water.
- d. Reservoir Area - The reservoir slopes are steep and wooded. The dam was designed with a sediment storage capacity equivalent to 50-years of sediment accumulation. There was no indication that sedimentation was occurring at a faster rate than that anticipated by the SCS in the design of this dam.
- e. Downstream Channel - The downstream channel appears to be in good condition. There are two culverts approximately 100 feet downstream of the impact basin. These culverts are 30 inch diameters corrugated metal pipes which carry flow under a fence crossing. These culverts were sized by the SCS to carry the maximum discharge from the outlet works and should not present an obstruction to flow out of the outlet channel.

The stream flows through a relatively narrow valley with steep, wooded side slopes. There are four houses and four mobile homes between the dam and the confluence of Ward Run and Harmon Creek, approximately 1.5 miles downstream of the dam.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

The dam and appurtenances are inspected by Washington County and SCS personnel each year according to the procedures for annual inspections of SCS dams of this type. Formal maintenance and inspection procedures are presented in the "Erosion and Sediment Control Plan" for this dam.

4.2 MAINTENANCE OF DAM AND APPURTENANCES

Routine maintenance is performed periodically by Washington County personnel. Formal maintenance procedures are described in the "Erosion and Sediment Control Plan" for this dam. At the present time, maintenance of the dam and appurtenances is considered to be adequate.

4.3 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

An emergency warning procedure is being developed for PA 483. However, at the present time, no formal procedure is in effect.

4.4 EVALUATION OF OPERATIONAL ADEQUACY

The present operational and maintenance procedures for the dam are considered to be adequate. Formal emergency warning procedures should be developed and implemented.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

- a. Design Data - Hydrologic and hydraulic design calculations for PA 483 were obtained from the SCS design report for this dam. The dam was designed to reduce floodwater damages in the Harmon Creek watershed by retarding the 100-year frequency storm without discharge occurring through the emergency spillway. A sediment storage volume equal to a 50-year accumulation of sediment has been provided in the impoundment.

The design high water and top of dam elevations were determined by routing the emergency spillway and freeboard hydrographs developed by the SCS through the reservoir. Both hydrographs were based on a storm duration of 6 hours. A summary of the rainfall and hydrograph data used in the design of the dam is included in Appendix D.

- b. Experience Data - During the few years this structure has been in operation, there have been no major floods reported in the watershed. The maximum reservoir level to date was reached in August 1979. At this time, the reservoir level was 2 to 3 feet above the top of the riser. This corresponds to a discharge of approximately 75 c.f.s. from the principal spillway.
- c. Visual Observations - No conditions were observed during the visual inspection which would indicate that the dam and appurtenance could not perform satisfactorily during a flood event.
- d. Overtopping Potential - PA 483 is an "Intermediate" size - "High" hazard dam requiring evaluation for a spillway design flood (SDF) equal to the Probable Maximum Flood (PMF). The SCS designed this dam using an SDF essentially equal to the PMF (see Appendix D). The dam and spillway should therefore pass the required SDF without overtopping the dam. After reviewing the calculations prepared by the SCS and judging them to be accurate, it was determined that further hydrologic and hydraulic analyses were unnecessary.
- e. Spillway Adequacy - The dam and appurtenances, as outlined above, was designed based on a freeboard hydrograph essentially equal to the PMF. The spillway is therefore considered to be "adequate".

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

- a. Visual Observations - The slides on the left abutment and the slumps on the right hillside above the emergency spillway do not appear to represent a threat to the continued structural stability of the dam at the present time.

The area on the left abutment where the second slide is developing may cause some damage or partial blockage of the outlet structure if remedial repairs are not performed. It is our opinion that if the roadway drainage was diverted farther down the valley from the dam before it is allowed to drain over the hillside, this would help prevent the left abutment erosion and increase the stability of the hillside. This could be accomplished by installing and maintaining an asphalt curb or earth berm on the valley (west) side of the township road.

It is recommended that the areas of the slides on the left abutment and the slumps on the right hillside be monitored during future inspections to ensure that these conditions do not become serious.

- b. Design and Construction Data - The dam was designed and constructed according to standard SCS procedures for structures of this type. Calculations of embankment slope and foundation stability were not available for review. However, a summary report from the SCS Soil Mechanics Laboratory at Lincoln, Nebraska dated 1 October 1970 presented the results of the laboratory soil testing program and slope stability analysis performed. Total stress shear strength parameters obtained and used in the slope stability analysis were reported as follows:

Foundation Materials -

Soil Type -	Stratified Alluvium (ML to GP-GM)
Type of Test Performed -	None*
Angle of Internal Friction (ϕ) -	35°
Cohesion (c) -	0

*Based upon the description of the materials, assumed shear strength values were used for analysis purposes.

Zone I (core) Embankment Materials -

Soil Type -	Soil derived from Siltstone and Shale (CH)
Type of Test Performed -	Consolidated Undrained Triaxial Shear Test
Angle of Internal Friction (ϕ) -	8°
Cohesion (c) -	950 p.s.f.
Sample Type -	Remolded and compacted at 95% Standard Proctor

Zone II (shell) Embankment Materials -

Soil Type -	Originally Gravel with 8 percent fines (GW-GC)**
Type of Test Performed -	Four inch diameter Consolidated Undrained Triaxial Shear Test
Angle of Internal Friction (ϕ) -	12°
Cohesion (c) -	775 p.s.f.
Sample Type -	Remolded and compacted

**Note: The sample originally contained 8% fines, however, for testing purposes 60 percent material greater than the No. 4 sieve was mixed with 40 percent minus No. 4 sieve material.

The results of 14 stability calculations (using a Modified Swedish Circle Method and checked by the sliding wedge analysis) was presented. The resulting minimum factor of safety for the upstream slope under full drawdown conditions was 1.44 with a 10 foot wide berm at Elevation 1030.2 feet M.S.L. and 3H:1V slope. The resulting minimum factor of safety for the downstream slope (2.5H:1V) under steady state seepage was 1.55 with a 10 foot wide berm at Elevation 1035.0 feet M.S.L. and a drain at $c/b = 0.6$ (or at a distance 0.6 times the base length of the downstream slope downstream from the vertical plane of the downstream edge of the crest of the dam). The geometry proposed in the analysis was later revised to have a 15 foot wide berm on the downstream slope at approximate Elevation 1046.0 feet M.S.L. The embankment internal drainage design was later revised to place the drain at $c/b = 0.5$ and to include a partial drainage blanket.

The remedial work consisting of grouting and the installation of additional drainage for the dam

and left abutment should help improve the structural stability.

Based upon the above information, coupled with the visual inspection, it is concluded that further stability assessments of the embankment are not necessary. However, should future inspections observe signs of distress which would affect the structural stability of the embankment, additional evaluations and corrective measures may become necessary.

- c. Operating Records Nothing in the operating information available indicates cause for concern relative to the structural stability of the dam.
- d. Post-Construction Changes - No changes adversely affecting the structural stability of the dam have been performed. After the initial construction was completed, a grout curtain and additions to the drainage system were installed. These should improve the structural stability of the dam.
- e. Seismic Stability - The dam is located in Zone 1 on the "Seismic Zone Map of the Contiguous United States," Figure 1, page D-30, "Recommended Guidelines for Safety Inspection of Dams." This is a zone of minor seismic activity. Therefore further consideration of the seismic stability is not warranted.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

- a. Safety - PA 483 was found to be in good overall condition at the time of inspection. PA 483 is a "High" hazard - "Intermediate" size dam requiring a spillway capacity equal to the PMF. As presented in Section 5, the spillway and reservoir are adequate to pass the PMF without overtopping the dam. Based on this investigation, the spillway is assessed as "adequate".
- b. Adequacy of Information - The information available and the observations made during the visual inspection are considered sufficient for this Phase I Inspection Report.
- c. Urgency - The owner should immediately initiate the actions discussed in paragraph 7.2.
- d. Necessity for Additional Data/Evaluation - No further investigation is necessary.

7.2 RECOMMENDATIONS/REMEDIAL MEASURES

The inspection revealed certain items of remedial work which should be performed by the owner immediately. These include:

- 1) The area on the left abutment where the second slide is developing should be monitored frequently (weekly) and remedial repairs should be performed as soon as possible. It is our opinion that diverting the roadway drainage farther down the road from the dam before it is allowed to drain over the hillside would help prevent the left abutment erosion and increase the stability of the hillside. This could be accomplished by installing and maintaining an earth berm or asphalt curb on the valley (west) side of the township road.
- 2) Remove the soil and debris that is blocking the riprapped drain in the junction of the left abutment and downstream embankment.
- 3) Fill the three vertical holes in the downstream embankment.

- 4) Replace the rusted-through animal guards on the drains.
- 5) Remove the debris that has collected in the trash rack on the low-level inlet of the riser.

The following items should be added to the maintenance procedures for the dam:

- 1) Periodically monitor the areas of the slide on the left abutment and the slumps on the right hillside to ensure that these conditions do not become serious.
- 2) Check the emergency gate and maintain it in an operable condition.

In addition, the following operational measures are recommended to be undertaken by the owner:

- 1) Develop a detailed emergency operation and warning system.
- 2) During periods of unusually heavy rainfall, provide around-the-clock surveillance of the dam.
- 3) When warning of a storm of major proportions is given by the National Weather Service, the owner should activate the emergency operation and warning system.

APPENDIX A

VISUAL INSPECTION CHECK LIST, FIELD SKETCH,
TOP OF DAM PROFILE, AND TYPICAL CROSS-SECTION

Phase 1
Visual Inspection
Check List

Name of Dam PA 483 County Washington State PA Coordinates Lat. N 40°23.3'
 NDI # PA 01124
 PennDER # 63-75 Long. W 80°28.3'
 SCS # PA 483
 Date of Inspection 19 March 1980 Weather Sunny, cool Temperature 50° F.

Pool Elevation at Time of Inspection 1030.2 ft. M.S.L. Tailwater at Time of Inspection 999.7 ft. M.S.L.

Inspection Personnel:

Michael Baker, Jr., Inc.:

Wayne D. Lasch
 Jeffrey A. Quay
 George A. Slagle

Field Review (9 June 1980):

John A. Dziubek
 James G. Uliniski

Owner's Representatives:

Ron Roach (Washington County
 Commissioners)
 Ed Petricca (Washington County
 Commissioners)
 Hosea Latshaw (Soil Conservation
 Service)

Jeffrey A. Quay Recorder

4-4

A-2

CONCRETE/MASONRY DAMS - Not Applicable

Name of Dam: PA 483
NDI # PA 01124

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
LEAKAGE		
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS		
DRAINS		
WATER PASSAGES		
FOUNDATION		

CONCRETE/MASONRY DAMS - Not Applicable

Name of Dam: PA 483
 NDI # PA 01124

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

SURFACE CRACKS
 CONCRETE SURFACES

STRUCTURAL CRACKING

VERTICAL AND HORIZONTAL
 ALIGNMENT

MONOLITH JOINTS

CONSTRUCTION JOINTS

EMBANKMENT

Name of Dam PA 483
 NDI # PA 01124

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	No surface cracks were observed. There are three 18 in. diameter vertical holes in the downstream embankment. These were probably excavated during installation of the grout curtain and never completely filled.	The holes should be filled.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	There is no erosion on the embankment. There has been a large slide on the left abutment downstream of the berm on the downstream embankment. Soil and debris from this slide is blocking the drain in the junction of the left abutment and downstream embankment. Another colluvial slide is developing immediately downstream from this slide. The tension crack at the top of the hillside has approximately 1.5 ft. of downward movement. This slide may cause damage or partial blockage of the outlet structure. There have been two separate, fairly large slumps on the right hillside above the emergency spillway. This hillside is very wet with scattered pools of standing water on the benches.	The soil and debris from the slide on the left abutment rock gutter should be removed.

EMBANKMENT

Name of Dam PA 483

NDI # PA 01124

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

VERTICAL AND HORIZONTAL
ALIGNMENT OF THE CREST

The vertical and horizontal alignment of
the crest both appear to be good.

RIPRAP FAILURES

The only riprap on the dam is in the
junctions of the downstream embankment
and abutments and in the outlet channel.
The riprap is in good condition except
in the downstream part of the junction
of the downstream embankment and left
abutment. The riprapped channel is
blocked with soil and debris from a
slide in this area.

The soil and debris from the
slide should be removed.

VEGETATION

The embankment is covered by a thick
growth of crown vetch. There are no
bare spots.

EMBANKMENT

Name of Dam PA 483
 NDI # PA 01124

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	These areas are in good condition except the junction of the downstream embankment and left abutment where soil and debris from a slide has blocked the riprapped drain running down the embankment/abutment junction.	The soil and debris from the slide should be removed.
ANY NOTICEABLE SEEPAGE	None observed	
STAFF GAGE AND RECORDER	None	
DRAINS	<p>The dam has an extensive drainage system. The outlet for the left foundation drain was submerged in the concrete impact basin and could not be inspected. There was no flow from the large drains which outlet downstream of the dam. The outlets of the drains all appear to be in good condition except that the animal guards are rusted through. There was a small amount of flow from the small horizontal drains in the left hillside downstream of the dam. The amount of flow from several of the horizontal drains was less than 1 g.p.m. per drain.</p>	<p>The animal guards that are rusted through should be replaced.</p>

OUTLET WORKS - Principal Spillway

Name of Dam: PA 483
NDI # PA 01124

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	The interior of the outlet conduit could not be inspected. According to the design plans, the outlet conduit is a 24 in. diameter reinforced concrete pipe.	
INTAKE STRUCTURE	The intake structure is a standard SCS two-stage riser. The concrete on the riser appears to be in good condition with no cracking or spalling. The trash rack on the low-level inlet is partially clogged with debris.	The trash rack on the low-level inlet should be cleared.
OUTLET STRUCTURE	The outlet structure is a reinforced concrete impact basin with a baffle wall and end sill. The concrete appears to be in good condition with no cracking or spalling.	
OUTLET CHANNEL	The outlet channel is a riprapped channel in good condition. There are two 30 in. C.M.P.'s approximately 100 ft. downstream of the impact basin which carry flow under a fence crossing.	These culverts do not represent a restriction to flow out of the outlet channel.
EMERGENCY GATE	The emergency gate is a 24 in. square slide gate. The gate is at the upstream end of a 73 ft. long, 24 in. diameter, reinforced concrete pipe which connects to the riser. Controls for the emergency gate are located on the upstream embankment to the right of the riser.	According to the owner's representatives, the emergency gate is never operated. It should be checked and maintained in an operable condition.

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A-8

UNGATED SPILLWAY - Emergency Spillway

Name of Dam: PA 483

NDI # PA 01124

VISUAL EXAMINATION OF		OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Not Applicable		
APPROACH CHANNEL	The approach channel is a vegetated earth channel 60 ft. wide. There is a good cover of crown vetch. The bottom of the channel is very wet with shallow pools of standing water in some places.		
DISCHARGE CHANNEL	The discharge channel is a vegetated earth channel 60 ft. wide. There is a good cover of crown vetch. The bottom of the channel is very wet with shallow pools of standing water in some places.		
BRIDGE AND PIERS	Not Applicable		

A-9

GATED SPILLWAY - Not Applicable

Name of Dam: PA 483
NDI # PA 01124

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

CONCRETE SILL

APPROACH CHANNEL

DISCHARGE CHANNEL

BRIDGE AND PIERS

GATES AND OPERATION
EQUIPMENT

INSTRUMENTATION

Name of Dam: PA 483

NDI # PA 01124

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
--------------------	--------------	----------------------------

MONUMENTATION/SURVEYS

No permanent markers were found.

OBSERVATION WELLS

None

WEIRS

None

PIEZOMETERS

None

OTHER

None

RESERVOIR

Name of Dam: PA 483

NDI # PA 01124

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

SLOPES

The reservoir slopes are steep and wooded. No erosion was observed.

SEDIMENTATION

The reservoir was designed with a sediment storage volume equivalent to a 50-year accumulation of sediment. There was no evidence to suggest that sedimentation was taking place at a rate faster than that anticipated by the SCS.

DOWNSTREAM CHANNEL

Name of Dam: PA 483

NDI # PA 01124

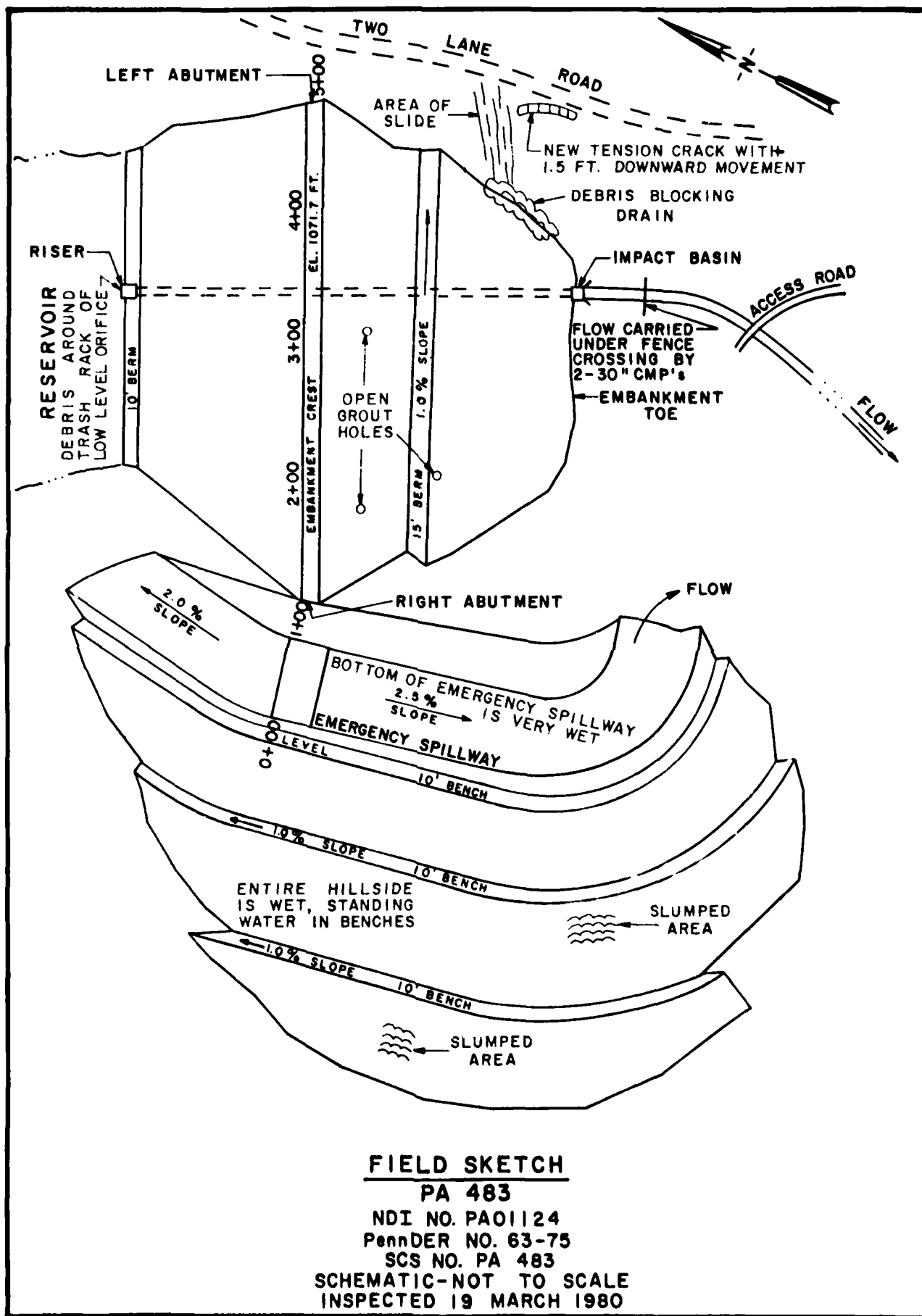
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The downstream channel appears to be in good condition. The only obstruction are two culverts approximately 100 ft. downstream of the impact basin.	These culverts do not represent a restriction to flow out of the outlet channel.

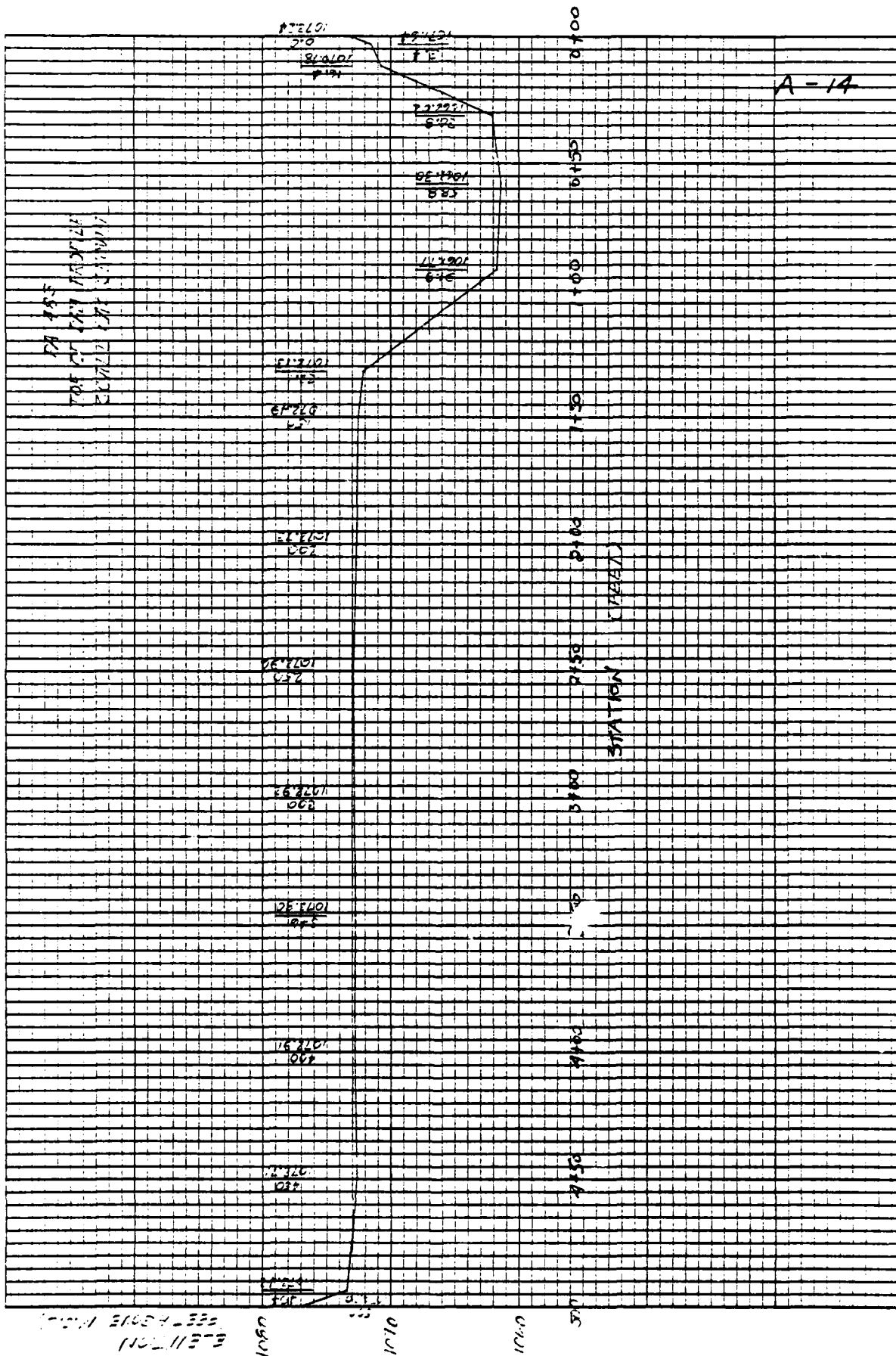
SLOPES

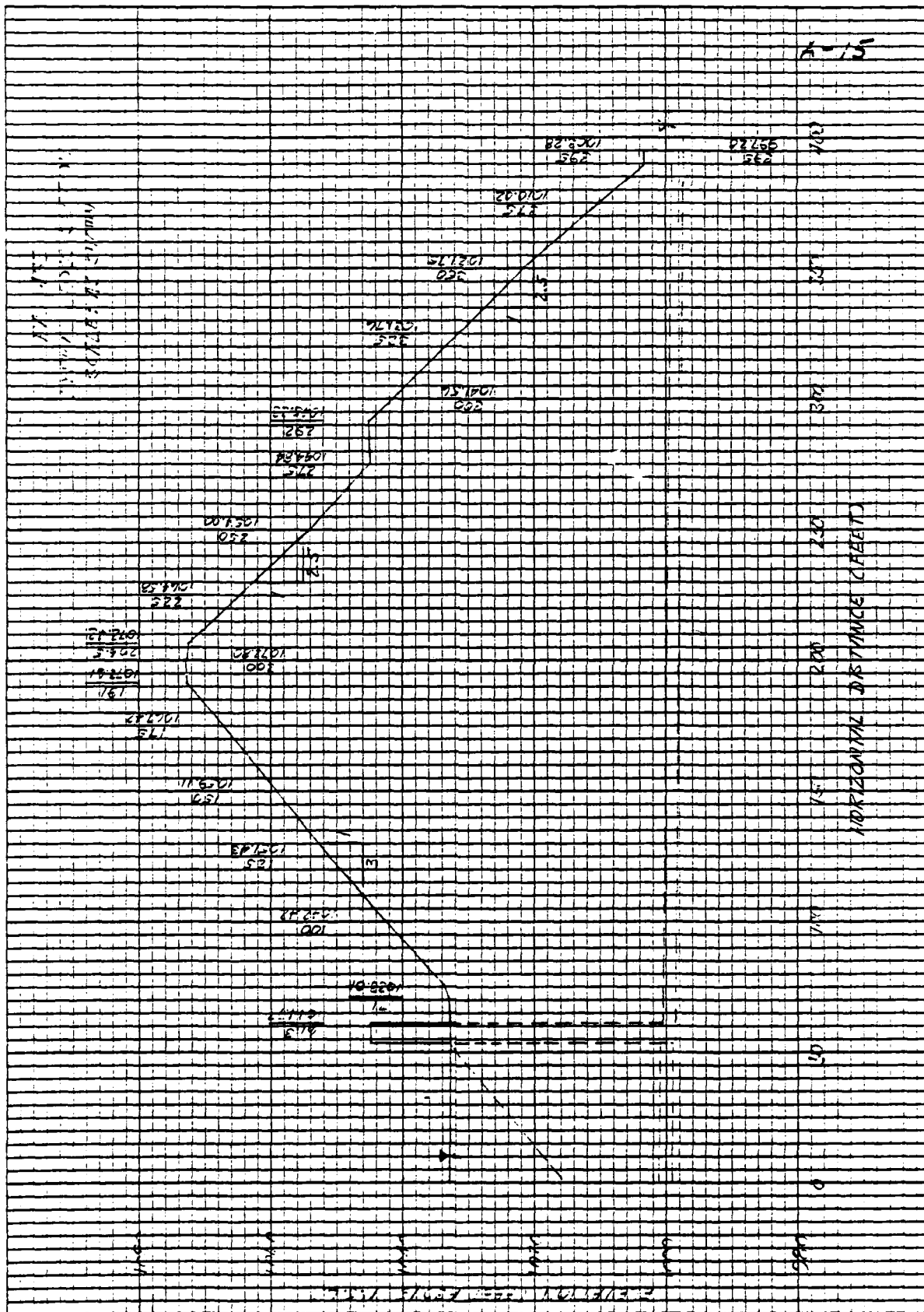
Downstream of the dam the stream flows through a relatively narrow valley with steep, wooded side slopes. The slope of the stream downstream of the dam is approximately 1%.

APPROXIMATE NO.
OF HOMES AND
POPULATION

There are 4 houses and 4 mobile homes in the floodplain between the dam and the confluence of Ward Run and Harmon Creek, approximately 1.5 mi. downstream of the dam. The estimated population is 30.







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APPENDIX B

ENGINEERING DATA CHECK LIST

ENGINEERING DATA
CHECK LIST
DESIGN, CONSTRUCTION, OPERATION

B-1

Name of Dam: PA 483
NDI # PA 01124

ITEM	REMARKS
------	---------

PLAN OF DAM

See Plate 3.

REGIONAL VICINITY MAP

See Plate 1, portions of the USGS 7.5 minute Burgettstown, PA and Avella, PA quadrangle maps, showing the dam location with state location insert.

CONSTRUCTION HISTORY

The dam was constructed by Solomon-Teslovich, Masontown, PA, from July 1971 to October 1973 (with appropriate winter shut-down periods). A grout curtain was placed by the John Grayson Company, Pittsburgh, PA, from June 1976 to November 1976. In 1977, the Anjo Construction Company installed additions to the dam's drainage system.

TYPICAL SECTIONS OF DAM

See Plates 4 and 6 and Appendix A, Sheets 14 and 15.

HYDROLOGIC/HYDRAULIC DATA

Design computations are included in the SCS design report and summarized in Section 5 and Appendix D of this report.

OUTLETS - PLAN,

DETAILS,
and

CONSTRAINTS

See Plate 8.

- DISCHARGE RATINGS

Included in the SCS design report and Appendix D of this report.

RAINFALL/RESERVOIR RECORDS

None available

Name of Dam: PA 483
NDI # PA 01124

B-2

ITEM	REMARKS
DESIGN REPORTS	The SCS design report "PA 483, Harmon Creek Watershed," was available through PennDER.
GEOLOGY REPORTS	See Appendix F for the regional geology; addition information is available in the SCS design report available through PennDER.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Design computations were done by the SCS for hydrology and hydraulics. Seepage and stability studies were also done by the SCS.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	A foundation and borrow investigation was performed with test pits and test borings. Results of the investigation are summarized in the SCS design report.
POST-CONSTRUCTION SURVEYS OF DAM	Post-construction surveys were conducted in connection with the installation of the grout curtain and additional drainage.
BORROW SOURCES	The borrow area was located above the right abutment.

Name of Dam: PA 483
NDI # PA 01124

B-3

ITEM	REMARKS
------	---------

MONITORING SYSTEMS

None

MODIFICATIONS

A grout curtain was installed in 1976. Additions to the drainage system were made in 1977.

HIGH POOL RECORDS

No formal records are kept. The reservoir reached its highest level in August 1979 when the water surface was 2 to 3 ft. above the top of the riser.

POST-CONSTRUCTION ENGINEERING
STUDIES AND REPORTS

Annual inspections are made by the Washington County SCS office.

PRIOR ACCIDENTS OR FAILURE OF DAM
DESCRIPTION
REPORTS

None

MAINTENANCE
OPERATION
RECORDS

Routine maintenance is performed by personnel of Washington County but records are not kept.

B-4

Name of Dam: PA 483

NDI # PA 01124

ITEM	REMARKS
------	---------

SPILLWAY PLAN,

SECTIONS,
and
DETAILS

See Plates 6, 7, and 8.

OPERATING EQUIPMENT
PLANS & DETAILS

Plans and details of the emergency gate are included in the design drawings available through PENNDER.

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 1.48 sq.mi. (Woods and strip mine areas)

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1030.2 ft. M.S.L.
(34.6 ac.-ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1061.3 ft. M.S.L.
(293 ac.-ft.)

ELEVATION MAXIMUM DESIGN POOL: 1071.7 ft. M.S.L.

ELEVATION TOP DAM: 1071.7 ft. M.S.L. (minimum)

SPILLWAY: Emergency Spillway

- a. Crest Elevation 1061.3 ft.
- b. Type Vegetated earth trapezoidal channel
- c. Bottom Width of Channel (Perpendicular to Flow) 60 ft.
- d. Length of Spillway along Centerline (Parallel to Flow) 500 ft.
- e. Location Spillover At right abutment
- f. Number and Type of Gates None

OUTLET WORKS: Principal Spillway

- a. Type Two stage rises unit connected to a 24 in. diameter reinforced concrete outlet pipe
- b. Location Approximately 120 ft. from left end of embankment
- c. Entrance Inverts El. 1030.2 ft. M.S.L. (low-level inlet);
El. 1043.1 ft. M.S.L. (upper-level inlet)
- d. Exit Inverts El. 997.6 ft. M.S.L.
- e. Emergency Drawdown Facilities A 24 in. diameter concrete pipe extends 73 ft. upstream into the reservoir from the base of the riser unit. A 24 in. slide gate, controlled from the upstream face of the embankment, can be opened to drawdown the reservoir.

HYDROMETEOROLOGICAL GAGES: None

- a. Type
- b. Location
- c. Records

MAXIMUM KNOWN NON-DAMAGING DISCHARGE: 75 c.f.s.

APPENDIX C

PHOTOGRAPH LOCATION PLAN AND PHOTOGRAPHS

DETAILED PHOTOGRAPH DESCRIPTIONS

Overall View of Dam

Top Photo - Overall View of the Downstream Face of the
(OV-T) Dam from the Right Abutment

Bottom Photo - Overall View of the Upstream Face of the
(OV-B) Dam from the Emergency Spillway

Photograph Location Plan

Photo 1 - View of the Riser Unit and Reservoir from the Crest
of the Dam

Photo 2 - View of the Riser Unit and Reservoir Drain Control

Photo 3 - View of the Upstream Half of the Spillway from the
Right Abutment

Photo 4 - View of the Slumped Area on the Right Abutment above
the Emergency Spillway

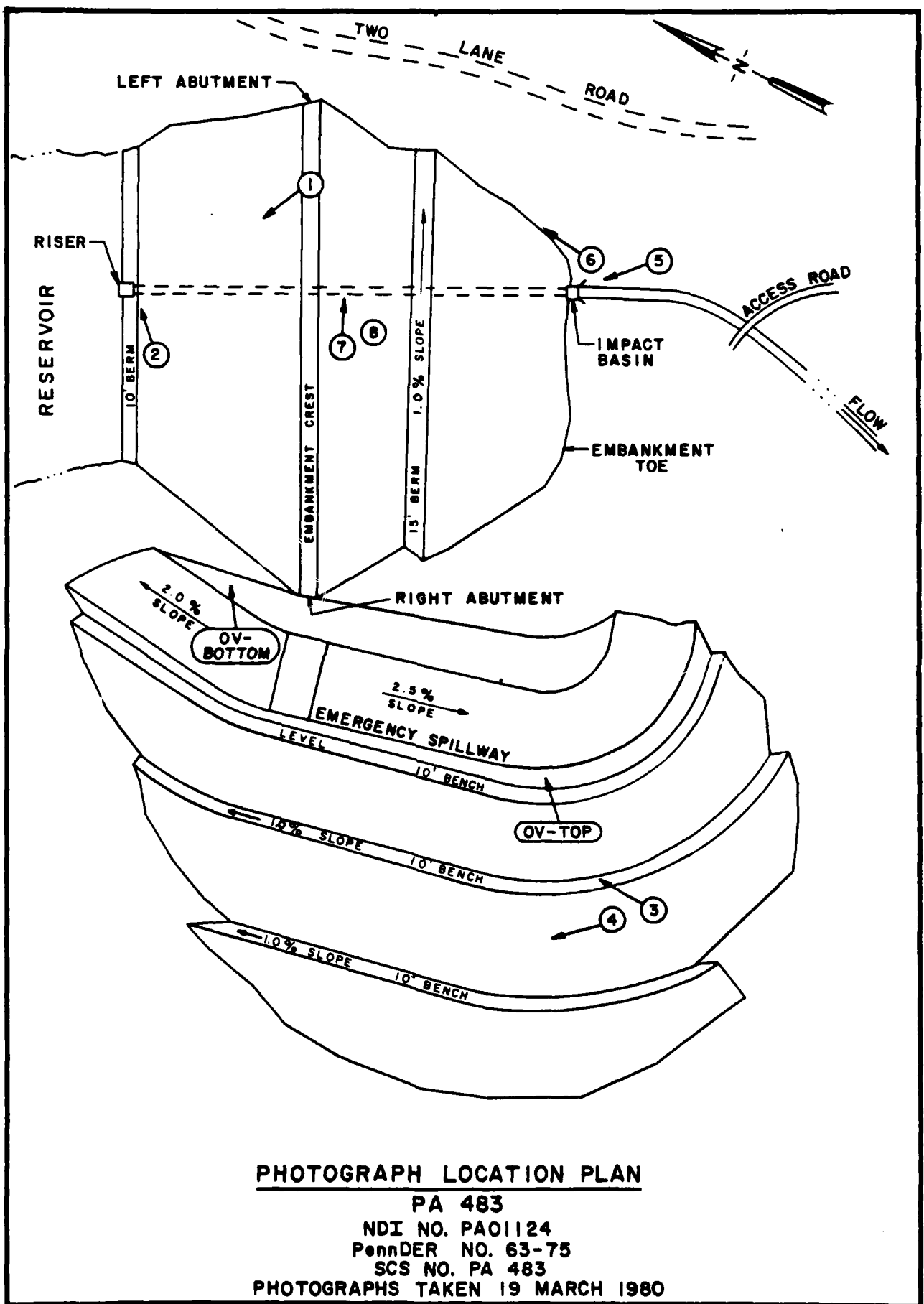
Photo 5 - View of the Impact Basin

Photo 6 - View of the Blockage in the Drainage Channel at the
Junction of the Left Abutment and the Downstream Side
of the Embankment (Material has sloughed off of
the left abutment)

Photo 7 - View of the Section of the Left Abutment Downstream
from the Crest of the Dam (Note slumping and eroding)

Photo 8 - View of an Unfilled Grout Hole (Approximately 50 feet
downstream from the crest of the dam in the center of
the embankment)

Note: Photographs were taken on 19 March 1980.



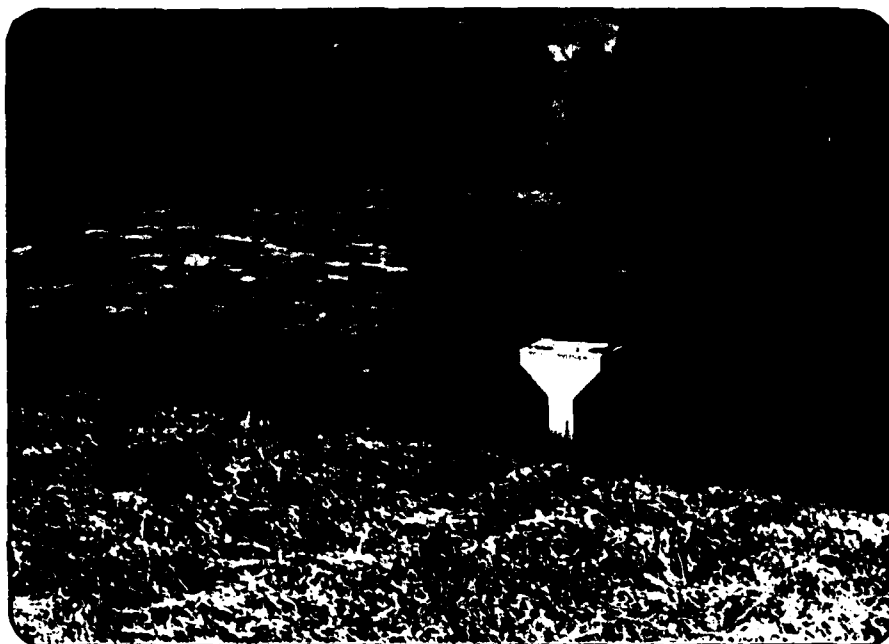


PHOTO 1. View of the Riser Unit and Reservoir from the Crest of the Dam

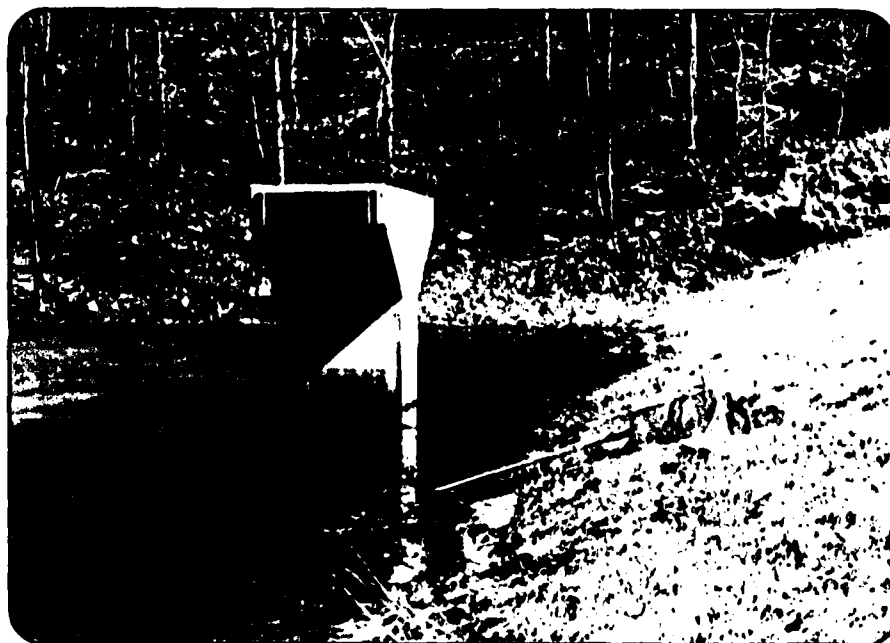


PHOTO 2. View of the Riser Unit and Reservoir Drain Control



PHOTO 3. View of the Upstream Half of the Spillway from the Right Abutment



**PHOTO 4. View of the Slumped Area on the Right Abutment above the
Emergency Spillway**

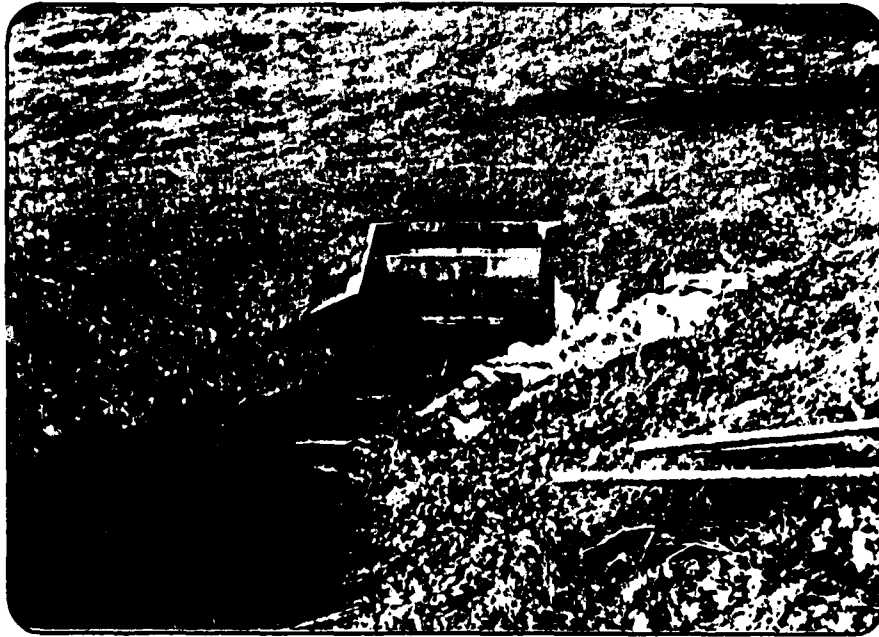


PHOTO 5. View of the Impact Basin



PHOTO 6. View of the Blockage in the Drainage Channel at the Junction of the Left Abutment and the Downstream Side of the Embankment



PHOTO 7. View of the Section of the Left Abutment Downstream from the Crest of the Dam

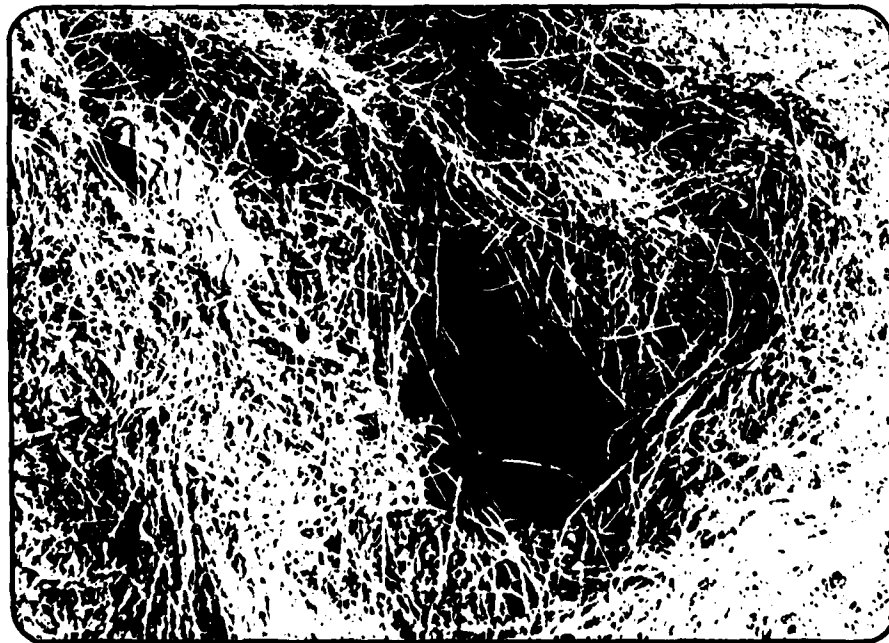


PHOTO 8. View of an Unfilled Grout Hole

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject FF 153 - H&H CONVS S.O. No. _____
Sheet No. _____ of _____
Drawing No. _____
Computed by _____ Checked by _____ Date _____

TABLE OF CONTENTS

H&H Analysis Data Base	1
Remarks	2
Hydrologic Data	3
Stage vs. Storage, Surface Area	4
Stage vs. Discharge	5
Top of Dam Profile	6
Drainage Area Map	7

HYDROLOGY AND HYDRAULIC ANALYSIS DATA BASE

NAME OF DAM: PA 483

PROBABLE MAXIMUM PRECIPITATION (PMP) = 24.1 INCHES/24 HOURS⁽¹⁾

STATION	1	2	3	4	5
Station Description	PA 483				
Drainage Area (square miles)	1.48				
Cumulative Drainage Area (square miles)	1.48				
Adjustment of PMF for Drainage Area (%) ⁽²⁾	Zone 7				
6 Hours	102				
12 Hours	120				
24 Hours	130				
48 Hours	140				
72 Hours	-				
Snyder Hydrograph Parameters					
Zone (3)	28B	(SCS parameters shown on sheet 3)			
C _p /C _t ⁽⁴⁾	0.57/1.7				
L (miles) ⁽⁵⁾	3.22				
L _{ca} (miles) ⁽⁵⁾	1.40				
t _p = C _t (L·L _{ca}) ^{0.3} (hours)	2.67				
Spillway Data					
Crest Length (ft)	(Spillway rating curve shown on sheet 5)				
Freeboard (ft)					
Discharge Coefficient					
Exponent					

(1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

(2) Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.

(3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

(4) Snyder's Coefficients.

(5) L = Length of longest water course from outlet to basin divide.

L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

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Box 280
Beaver, Pa. 15009

Subject PA 483 S.O. No. _____
Sheet No. 2 of 7
Drawing No. _____
Computed by JAO Checked by _____ Date _____

REMARKS

PA 483 was designed by the SCS in accordance with standard criteria circa 1970. The design flood was based on rainfall essentially equal to the probable maximum precipitation. Therefore, the dam should be capable of passing the Probable Maximum Flood (PMF) without overtopping. In view of the above, no additional hydrologic or hydraulic calculations were performed for this report. The SCS calculations were reviewed, however, and are summarized in this appendix.

In addition, the conclusions presented pertain to present conditions, and the effect of future development & on the hydrology has not been considered.

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Beaver, Pa. 15009

Subject

PA 433 - Hydrologic Data

S.O. No.

Sheet No. 3 of 7

Drawing No.

Computed by

JAS

Checked by

Date

Pertinent Hydrologic Data

Drainage Area = 1.48 square miles

Runoff Curve No. = 76 (Antecedent Moisture Condition II)

Storm Duration = 6 hours

Time of Concentration = 1.49 hours

Hydrograph	Rainfall (in)		Runoff (in)	Peak Inflow (c.f.s)
	Point	Areal		
Emergency Spillway	9.6	9.6	6.63	1162
Floodboard	25.8	25.8	22.35	7085

For additional information refer to the SCS Design Report for PA 433.

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Box 280
Beaver, Pa. 15009

Subject PA 483 - Stage 15 Storage S.O. No. _____
Surface Area Sheet No. 4 of 7
Computed by JHQ Drawing No. _____
Checked by _____ Date _____

stage (ft., M.S.L.)	storage (ac-ft)	surface area (acres)
1011	0	0
1015	0.9	0.56
1020	4.2	1.56
1025	16.8	2.66
1030	33.0	3.81
1035	54.9	4.45
1040	82.8	6.23
1045	117.3	7.58
1050	160.0	9.51
1055	213.6	11.95
1060	281.8	15.32
1065	370.0	19.91
1070	482.0	25.33
1075	628.4	32.84
1080	815.6	42.04

Note: The above information was taken from the SCS
Design Report for PA 483.

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Subject

S.O. No.

PF 483 - Outlet Works and
Spillway Discharge Ratings

Sheet No. 5 of 7

Drawing No.

Computed by

Checked by

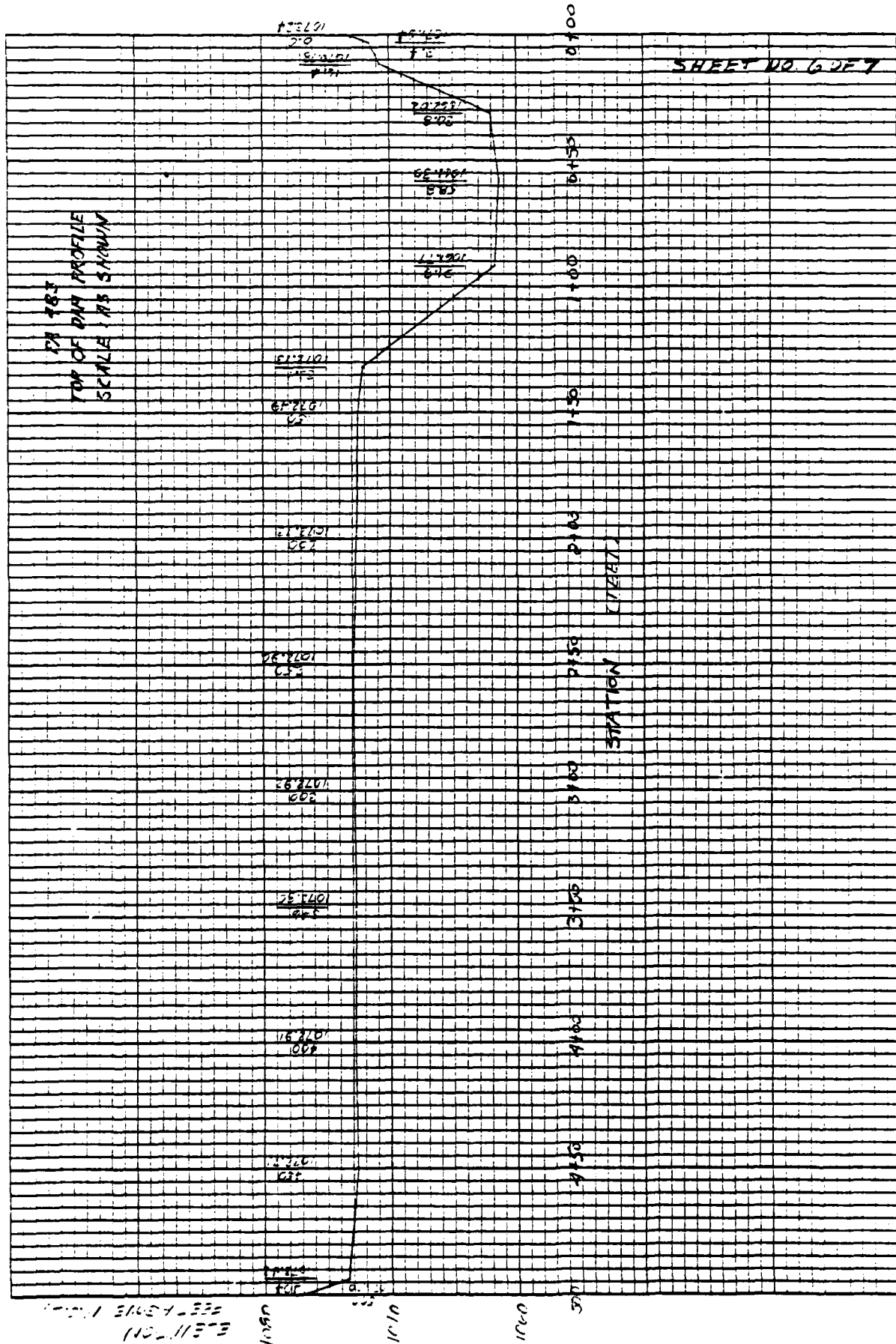
Date

Elevation (ft. MSL)	Discharge (c.f.s.)		Remarks
	Outlet Works	Spillway	
1030.2	0		normal pool
1030.7	0		
1035	64.8		
1040	60.1		crest of riser
1043.1	71.7		
1045	73.2		
1050	77.1		
1055	80.7		
1060	84.3		emergency spill. crest
1061.3	85.1	0	
1065	87.6	1,092	
1070	90.8	4,764	design. top of dam
1071.7	91.9	6,432	
1075	94.0	10,498	

The above information was taken from the SCC Design Report for PF 483. Information concerning the origin of this data is also contained in the design report.

78.3
 TOP OF DVA PROFILE
 SCALE 1/8" = 1'

SHEET NO. 6257



1000
 900
 800
 700
 600
 500
 400
 300
 200
 100
 0

1000

900

800

700

600

500

400

300

200

100

0

1000

900

800

700

600

500

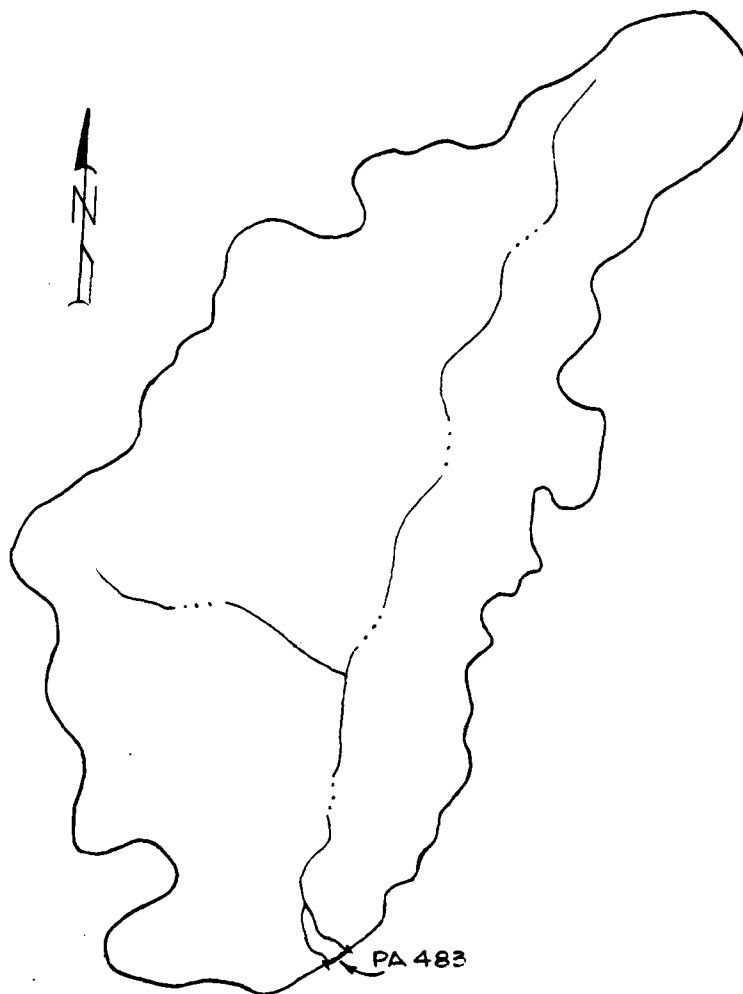
400

300

200

100

0



QUADS
BURGETTSTOWN

DRAINAGE MAP
PA-483

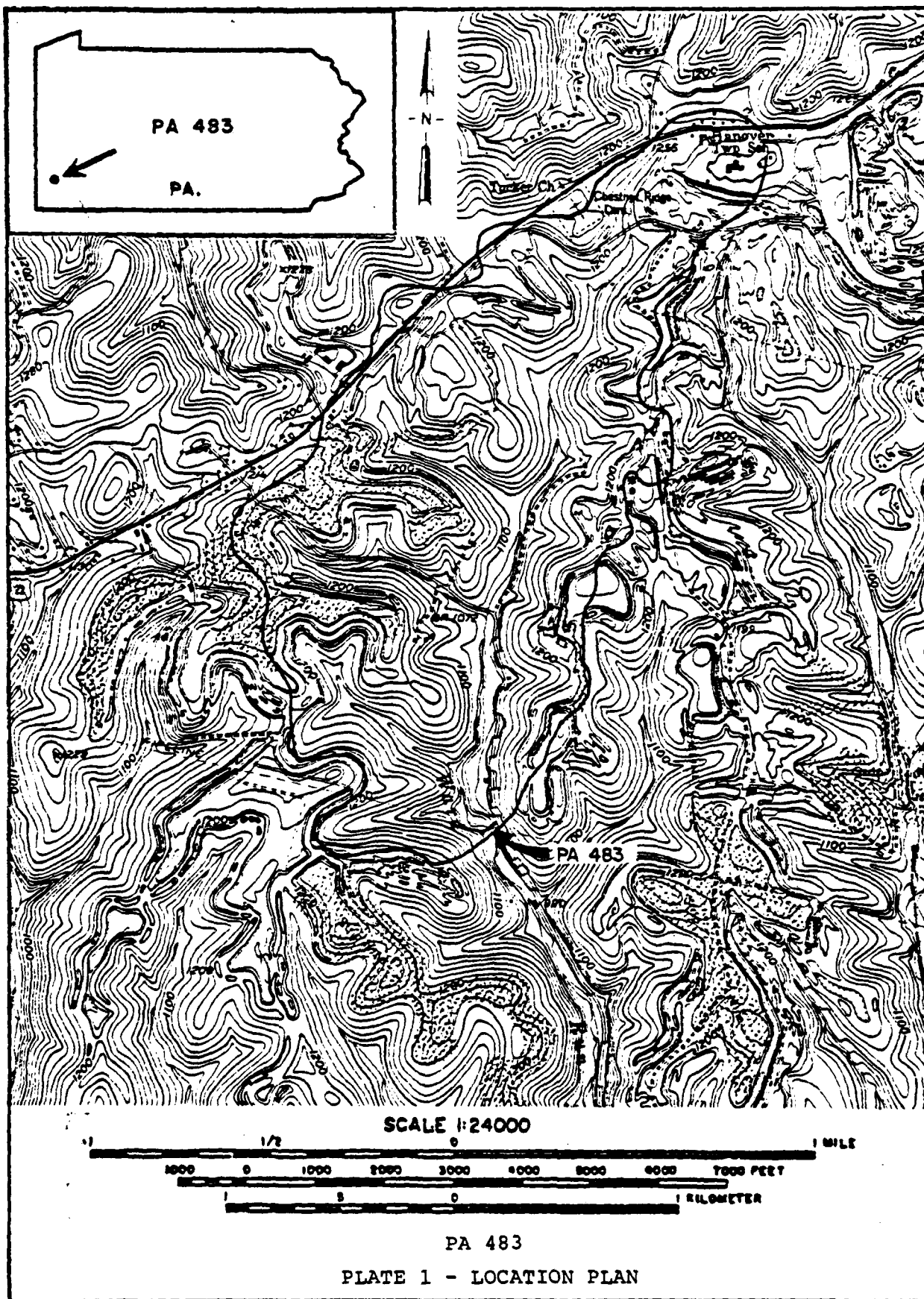
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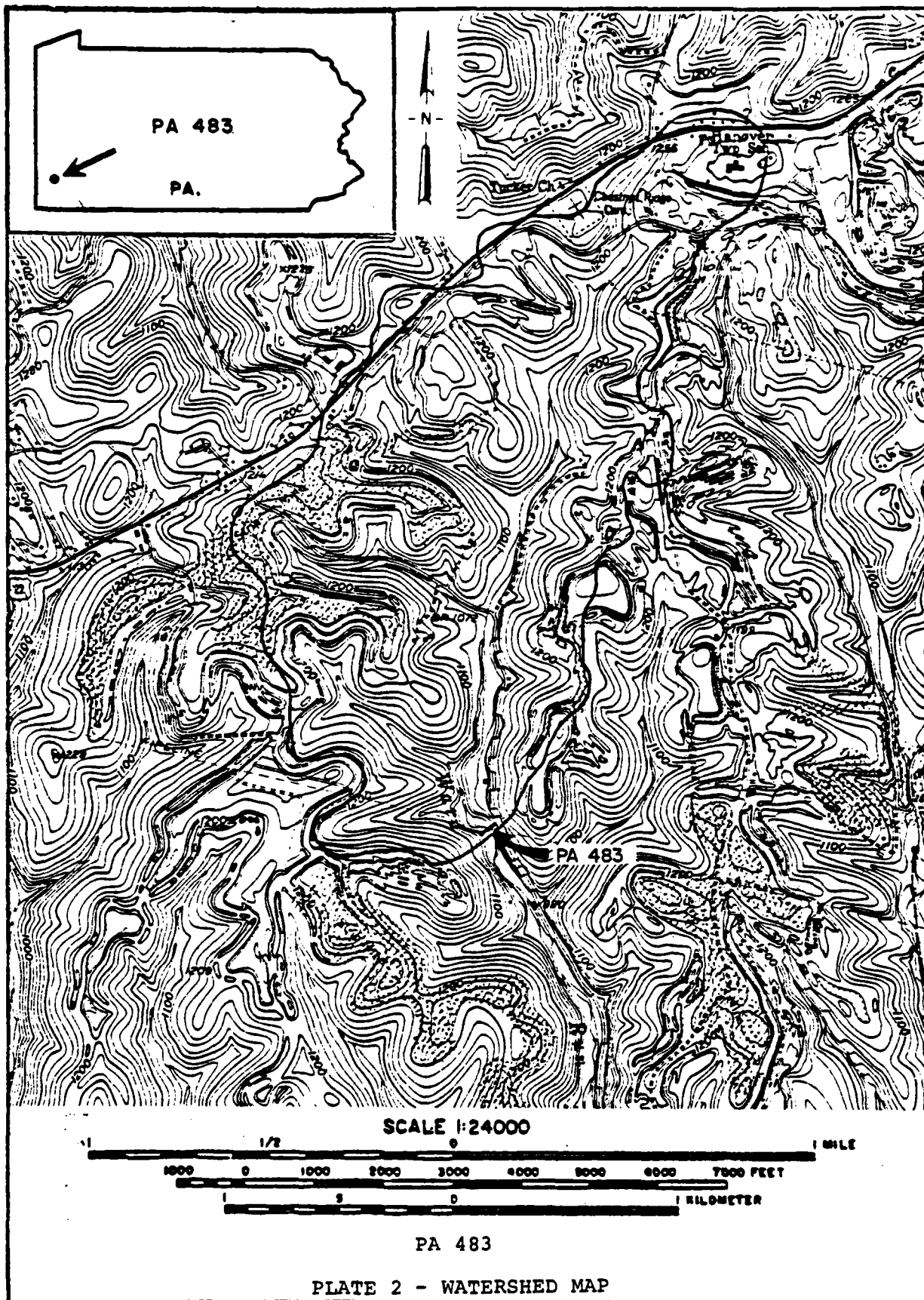
APPENDIX E

PLATES

CONTENTS

- Plate 1 - Location Plan
- Plate 2 - Watershed Map
- Plate 3 - Plan of Structural Works
- Plate 4 - Fill Placement
- Plate 5 - Cut-off Trench
- Plate 6 - Principal Spillway
- Plate 7 - Riser Structural Details
- Plate 8 - Impact Basin Details
- Plate 9 - Drainage



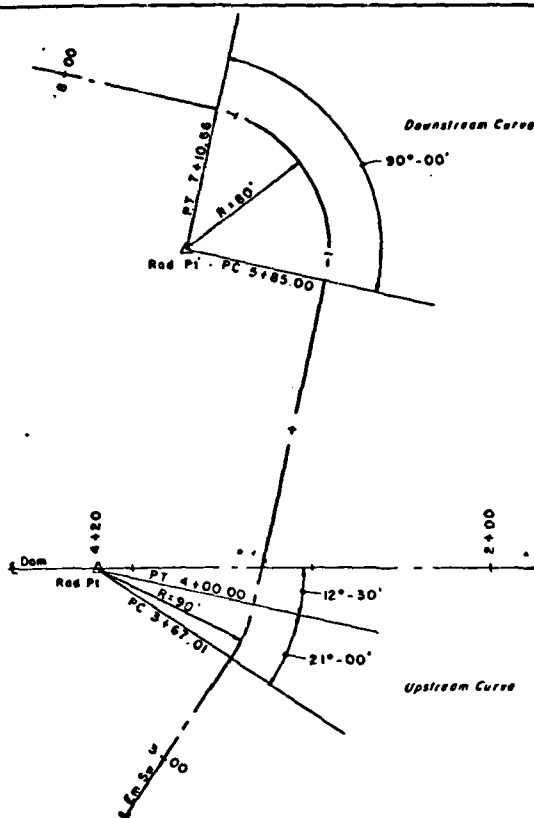


Downstream Curve Data

I = 90°-00'
R = 80'
E = 33.14'
M = 23.43'
C = 113.14'
L = 125.66'
T = 80.00'
PC = 5+85.00
PT = 7+10.66

Upstream Curve Data

I = 21°-00'
R = 90'
E = 1.53'
M = 1.51'
C = 32.80'
L = 32.99'
T = 16.68'
PC = 3+67.01
PT = 4+00.00



EMERGENCY SPILLWAY LAYOUT

Ref. Pt. 3
Head of 8d nail in elec. pole no. 190
SE Pole of double poles on E side of road.

Ref. Pt. 2
Head of 8d nail in guard post no. 8 from upstream end of rails

Brass Pin
El. 1093.46
Sta. 7+90

Ref. Pt. 1
Head of 8d nail in guard rail post no. 6 from upstream end of rails.

Brass Pin
El. 1150.22
Sta. 1+00

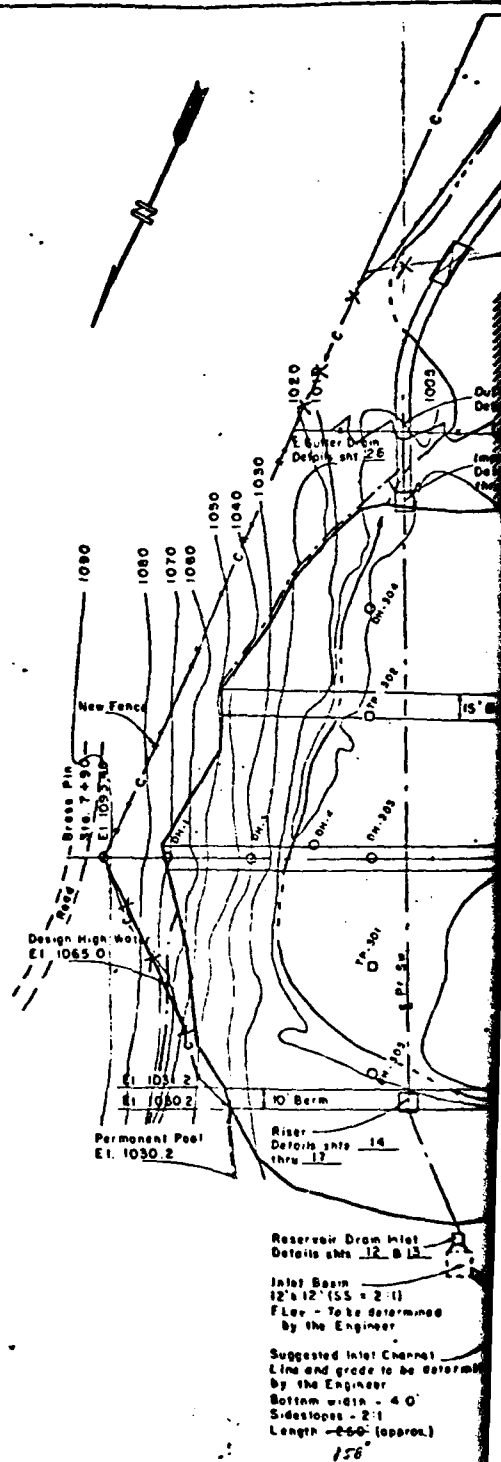
Ref. Pt. 1
Head of 8d nail in notch of 6" white oak
El. 1150.82

Ref. Pt. 2
Head of survey tack in 4" basswood tree

DAM LAYOUT NOT TO SCALE

CONSTRUCTION NOTES

- For logs of test holes see shs. 27 thru 31.
- For E. spillway layout see sh. 8.
- Access roads to be provided to both berms.



Reservoir Drain Inlet
Details shs. 12, B, 13

Inlet Basin
12' x 12' (55' x 2' 11")
Filter - To be determined by the Engineer

Suggested Inlet Channel
Line and grade to be determined by the Engineer
Bottom width - 4' 0"
Sideslopes - 2:1
Length - 600' (approx.)

150'

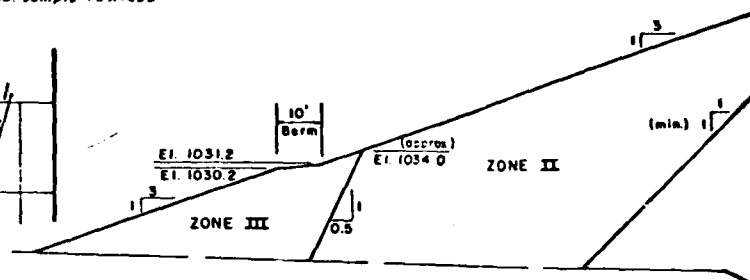
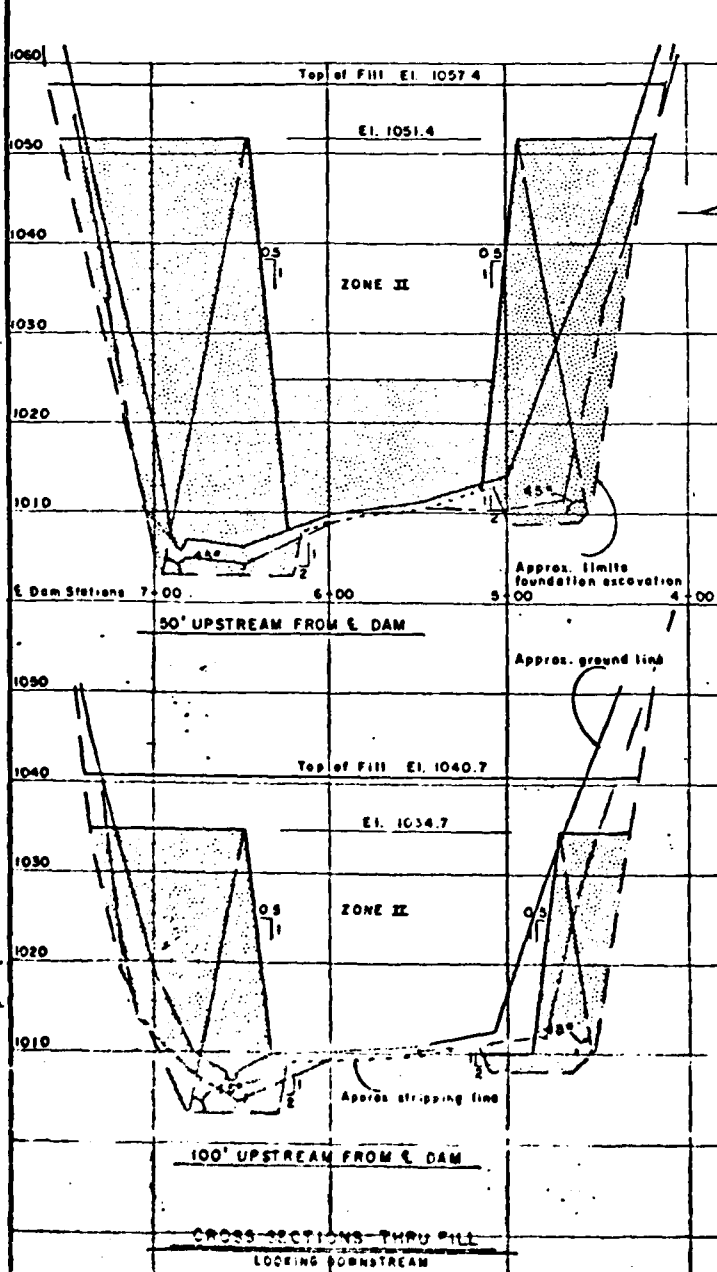
SELECTIVE PLACEMENT	MATERIAL	MAX ROCK SIZE	MAX LIFT	REQ'D WATER CONTENT	COMPACTION	
					CLASS	DEFINITION
ZONE I	Material as represented by Lab samples 70W1693 & 70W1695 classified as CL & CH respectively	6"	9"	Optimum - 2% to + 3%	A	95% Max density by ASTM D-698, Method "A"
ZONE II	Material as represented by Lab samples 70W1694 & 70W1696 classified as GC & GW-GC respectively	6"	9"	As designated by the Engineer	C	Compact with min six passes of 450 p.s.i. tamping roller per lift
ZONE III	Sandstone escav from the Emergency Spillway and abutments, and oversized material raked from Zones I & II.	12"	18"	As designated by the Engineer	C	Compact with min six passes of 450 p.s.i. tamping roller per lift

1 Maximum permissible lift thickness before compaction

2 Water content of fill matrix at time of compaction

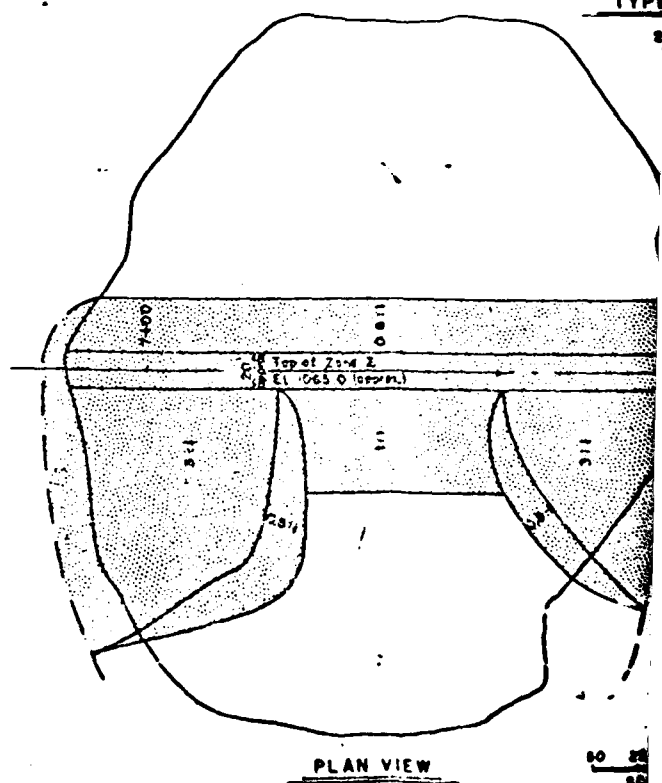
3 For typical compaction curves, see sheet 32

4 Material placed in cutoff will be classified as CL represented by Lab sample 70W1693
Zone I size shown is minimum.



E. Core Detail

TYPE



PLAN VIEW

50 25 50

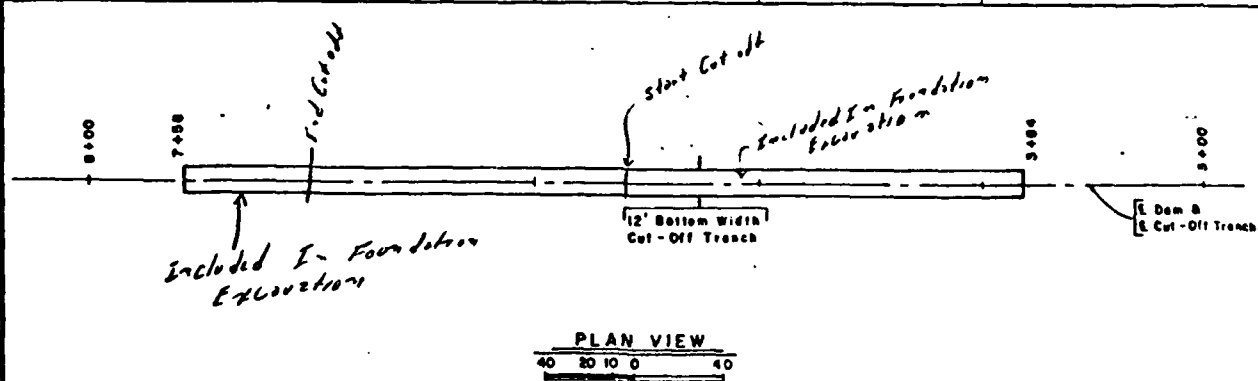
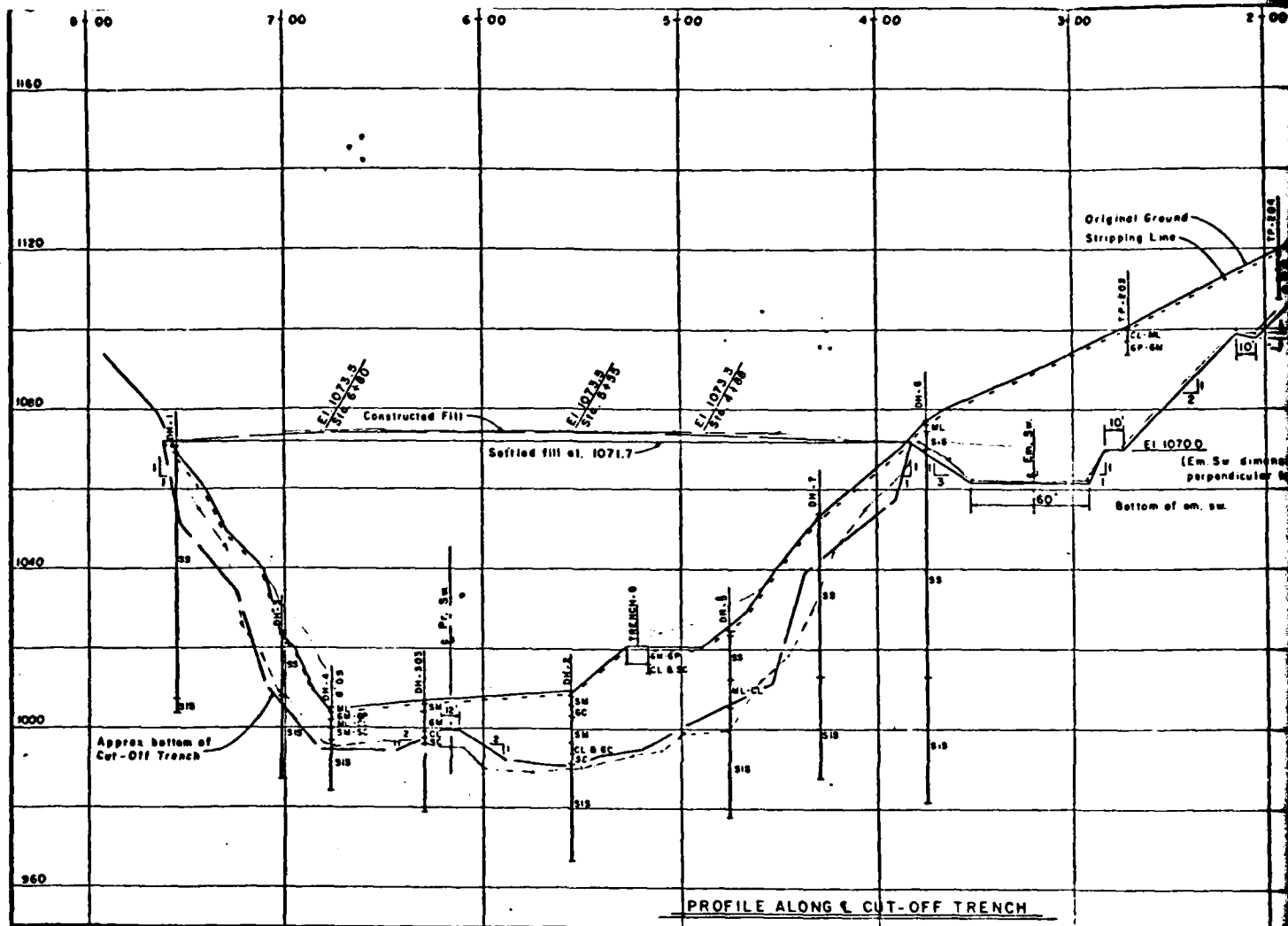
1. Constructed slopes are

2 92 1	Upstream
2 43 1	Downstream

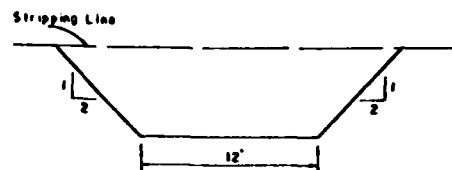
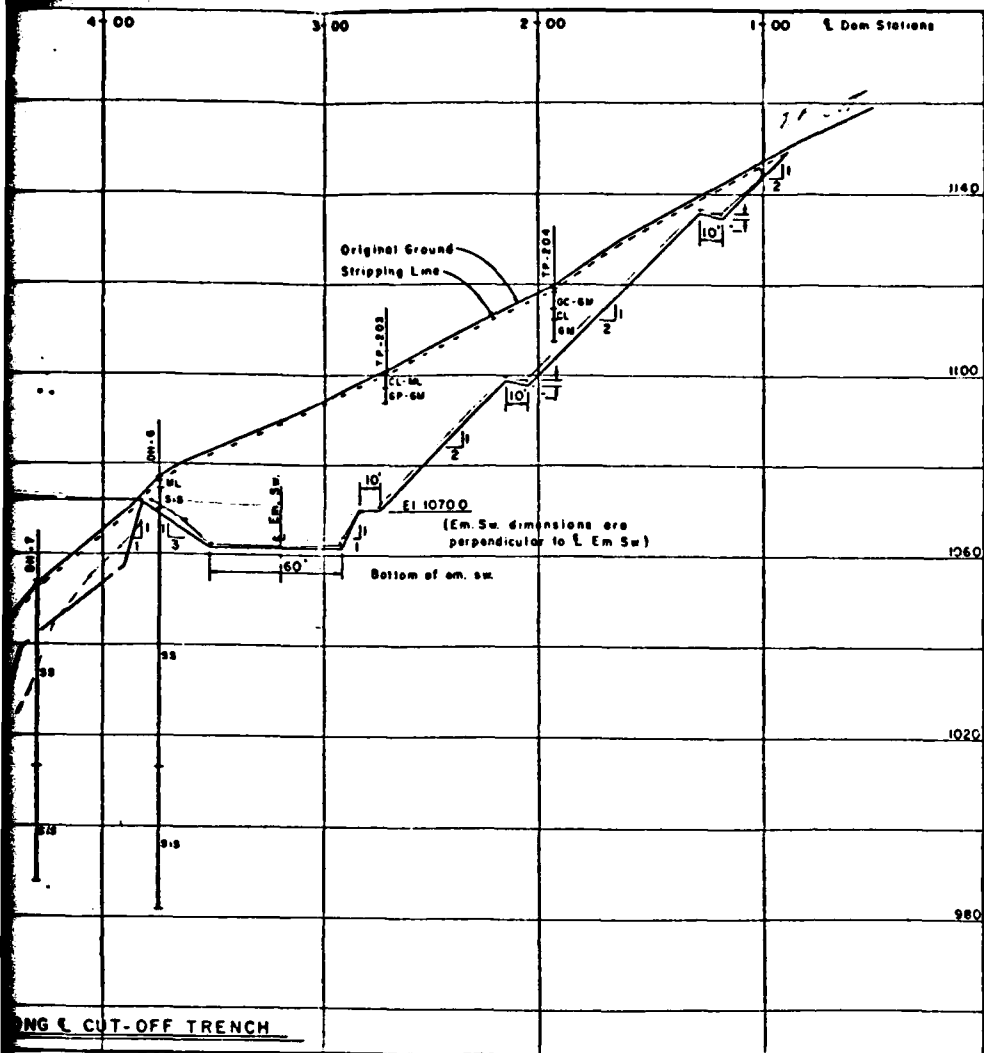
2. For constructed full elevations see
shl 3

Name	<i>J. D. L.</i>	Date	1-71
Room	CRISE	Date	1-71
Room		Date	
Name	<i>Guy F. K.</i>	Date	3-71
Room		Date	

PA-483-P



CONSTRUCTION NOTE
For logs of test holes see sheets 27 thru 31.



TYPICAL SECTION
CUT - OFF TRENCH

NG & CUT-OFF TRENCH

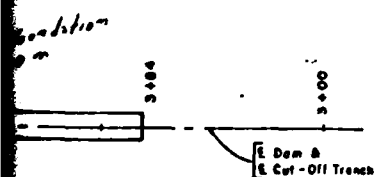


PLATE 5

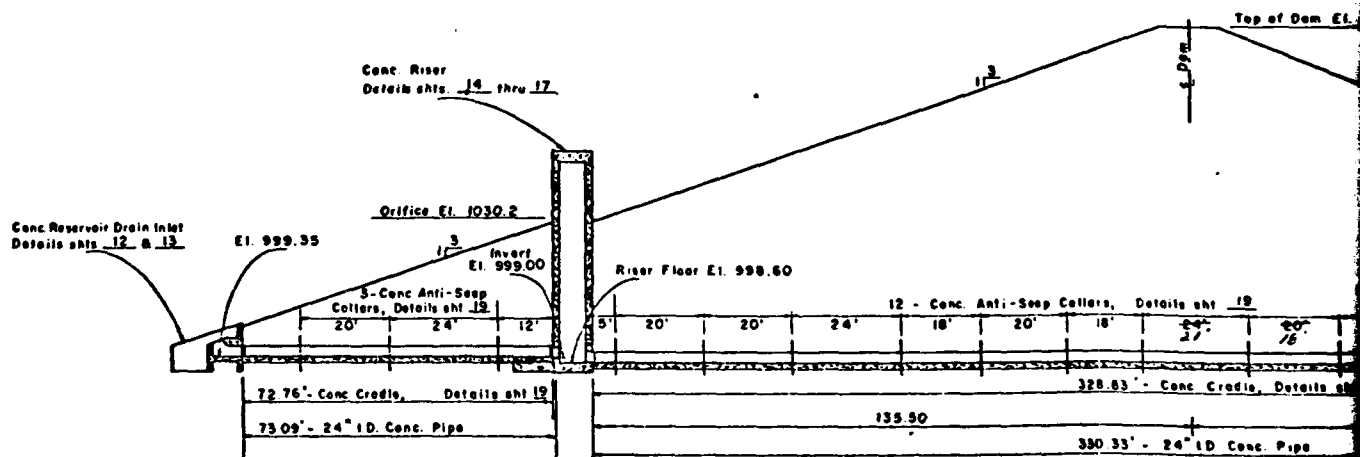
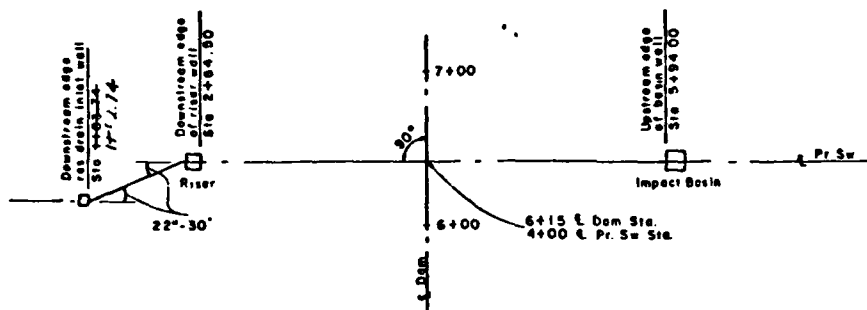
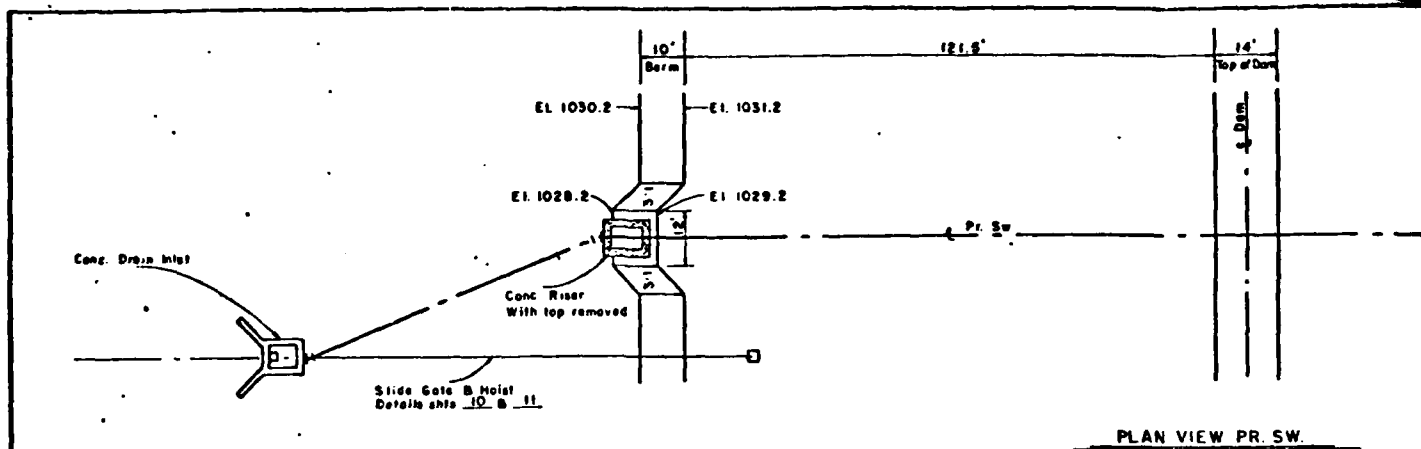
AS BUILT PLANS

HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-483
WASHINGTON COUNTY, PENNSYLVANIA
CUTOFF TRENCH

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Drawn by *John D. Shuler* 12-70
Checked by *C. CRISE* 12-70
Traced by *2, 5, 7, 11, 3-71*

PA-483-F



AS BUILT
24" ID. PR SW PIPE JOINT DATA

Joint	Dist From Riser Wall	Invert El
1	0.0	116.60
2	11.33	116.55
3	22.67	116.50
4	34.00	116.46
5	45.33	116.41
6	56.67	116.38
7	68.00	116.34
8	79.33	116.31
9	90.67	116.28
10	102.00	116.24
11	113.33	116.21
12	124.67	116.18
13	136.00	116.14
14	147.33	116.11
15	158.67	116.07
16	169.33	116.04
17	180.67	116.00
18	192.00	115.97
19	203.33	115.93
20	214.67	115.90
21	226.00	115.86
22	237.33	115.83
23	248.67	115.79
24	260.00	115.76
25	271.33	115.72
26	282.67	115.69
27	294.00	115.65
28	305.33	115.62
29	316.67	115.58
30	328.00	115.55
31	339.33	115.51
32	350.67	115.48
33	362.00	115.44
34	373.33	115.41
35	384.67	115.37
36	396.00	115.34
37	407.33	115.30
38	418.67	115.27
39	430.00	115.23
40	441.33	115.20
41	452.67	115.16
42	464.00	115.13
43	475.33	115.09
44	486.67	115.06
45	498.00	115.02
46	509.33	114.99
47	520.67	114.95
48	532.00	114.92
49	543.33	114.88
50	554.67	114.85
51	566.00	114.81
52	577.33	114.78
53	588.67	114.74
54	600.00	114.71
55	611.33	114.67
56	622.67	114.64
57	634.00	114.60
58	645.33	114.57
59	656.67	114.53
60	668.00	114.50
61	679.33	114.46
62	690.67	114.43
63	702.00	114.39
64	713.33	114.36
65	724.67	114.32
66	736.00	114.29
67	747.33	114.25
68	758.67	114.22
69	770.00	114.18
70	781.33	114.15
71	792.67	114.11
72	804.00	114.08
73	815.33	114.04
74	826.67	114.01
75	838.00	113.97
76	849.33	113.94
77	860.67	113.90
78	872.00	113.87
79	883.33	113.83
80	894.67	113.80
81	906.00	113.76
82	917.33	113.73
83	928.67	113.69
84	940.00	113.66
85	951.33	113.62
86	962.67	113.59
87	974.00	113.55
88	985.33	113.52
89	996.67	113.48
90	1008.00	113.45
91	1019.33	113.41
92	1030.67	113.38
93	1042.00	113.34
94	1053.33	113.31
95	1064.67	113.27
96	1076.00	113.24
97	1087.33	113.20
98	1098.67	113.17
99	1110.00	113.13
100	1121.33	113.10
101	1132.67	113.06
102	1144.00	113.03
103	1155.33	112.99
104	1166.67	112.96
105	1178.00	112.92
106	1189.33	112.89
107	1200.67	112.85
108	1212.00	112.82
109	1223.33	112.78
110	1234.67	112.75
111	1246.00	112.71
112	1257.33	112.68
113	1268.67	112.64
114	1280.00	112.61
115	1291.33	112.57
116	1302.67	112.54
117	1314.00	112.50
118	1325.33	112.47
119	1336.67	112.43
120	1348.00	112.40
121	1359.33	112.36
122	1370.67	112.33
123	1382.00	112.29
124	1393.33	112.26
125	1404.67	112.22
126	1416.00	112.19
127	1427.33	112.15
128	1438.67	112.12
129	1450.00	112.08
130	1461.33	112.05
131	1472.67	112.01
132	1484.00	111.98
133	1495.33	111.94
134	1506.67	111.91
135	1518.00	111.87
136	1529.33	111.84
137	1540.67	111.80
138	1552.00	111.77
139	1563.33	111.73
140	1574.67	111.70
141	1586.00	111.66
142	1597.33	111.63
143	1608.67	111.59
144	1620.00	111.56
145	1631.33	111.52
146	1642.67	111.49
147	1654.00	111.45
148	1665.33	111.42
149	1676.67	111.38
150	1688.00	111.35
151	1699.33	111.31
152	1710.67	111.28
153	1722.00	111.24
154	1733.33	111.21
155	1744.67	111.17
156	1756.00	111.14
157	1767.33	111.10
158	1778.67	111.07
159	1790.00	111.03
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161	1812.67	110.96
162	1824.00	110.92
163	1835.33	110.89
164	1846.67	110.85
165	1858.00	110.82
166	1869.33	110.78
167	1880.67	110.75
168	1892.00	110.71
169	1903.33	110.68
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175	1971.33	110.47
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178	2005.33	110.36
179	2016.67	110.33
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181	2039.33	110.26
182	2050.67	110.22
183	2062.00	110.19
184	2073.33	110.15
185	2084.67	110.12
186	2096.00	110.08
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188	2118.67	110.01
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191	2152.67	109.91
192	2164.00	109.87
193	2175.33	109.84
194	2186.67	109.80
195	2198.00	109.77
196	2209.33	109.73
197	2220.67	109.70
198	2232.00	109.66
199	2243.33	109.63
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202	2277.33	109.52
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204	2300.00	109.45
205	2311.33	109.42
206	2322.67	109.38
207	2334.00	109.35
208	2345.33	109.31
209	2356.67	109.28
210	2368.00	109.24
211	2379.33	109.21
212	2390.67	109.17
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223	2515.33	108.79
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237	2674.00	108.30
238	2685.33	108.26
239	2696.67	108.23
240	2708.00	108.19
241	2719.33	108.16
242	2730.67	108.12
243	2742.00	108.09
244	2753.33	108.05
245	2764.67	108.02
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249	2810.00	107.88
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255	2878.00	107.67
256	2889.33	107.63
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319	3603.33	105.43
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321	3626.00	105.36
322	3637.33	105.32
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325	3671.33	105.22
326	3682.67	105.18
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329	3716.67	105.08
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350	3954.67	104.34
351	3966.00	104.31
352	3977.33	104.27
353	3988.67	104.24
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355	4011.33	104.17
356	4022.67	104.13
357	4034.00	104.10
358	4045.33	104.06
359	4056.67	104.03

121.6'

14'

Top of Dam

1.0m

Pr. Sw.

Conc. Impact Basin

2:1

Outlet Channel

2:1

20' Rock Riprap Section
Details sht. 9

PLAN VIEW PR. SW.

CONSTRUCTION NOTES

1. Outlet end of pr. sw. pipe to be finished so that no metal is exposed. Do not finish 10' section.
2. Pipe layout data will be furnished by the Engineer
3. For drain fill gradation limits see sht. 6

Top of Dam El. 1071.7

2.5

2.5

2.5

Conc. Impact Basin

Details sht. 20 thru 24

Invert El. 997.60

Bottom of Outlet Channel
Length = 300'-approx. F/D
Slope = 0.005 ft/ft

12 - Conc. Anti-Seep Collars, Details sht. 19

328.83' - Conc. Cradle, Details sht. 19

135.50

194.83'

330.33' - 24" I.D. Conc. Pipe

20' Rock
Riprap Sect.

PROFILE ALONG E. PR. SW.

24" I.D. Reinforced Concrete Pressure Pipe, Steel Cylinder Type, Spec. 541 (AWWA C-300 or 301)

- 400' - Straight Sections
 - 2 - 22° 30' Elbows
 - 1 - Bell Wall Fitting (for 18" wall) (Detail sht. 25)
 - 2 - Spigot Wall Fitting (for 18" wall) (Detail sht. 19)
- Pressure Head = 75'
Load = 65,808 lbs. per lin. ft.
Min. 3 edge bearing strength for:
0.01" Crack non-prestressed pipe = 27,215 lbs. per lin. ft.
0.001" Crack prestressed pipe = 46,202 lbs. per lin. ft.

BUT NOT OVER 10' OF 6"

207.42' Total

22' 784'

When pipe furnished has an outside diameter greater than that called for on the plans, the 3 edge bearing strength must equal or exceed the specified strength multiplied by the ratio of the outside diameter furnished to the outside diameter specified.

AS BUILT PLANS

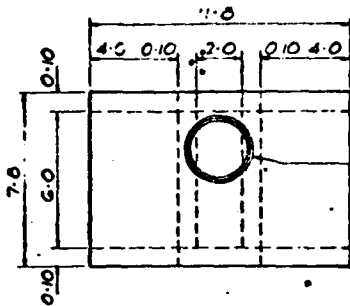
20 10 5 0 20 PLATE 6
SCALE IN FEET

HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-483
WASHINGTON COUNTY, PENNSYLVANIA

PRINCIPAL SPILLWAY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

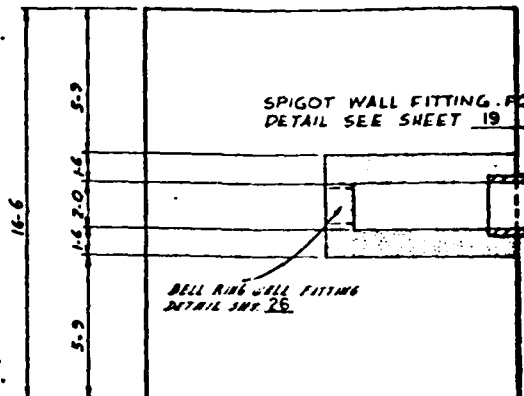
Designed by *John D. Schuler* 12-70
Drawn by *C. CRISSE* 12-70
Checked by *John D. Schuler* 12-70
PA-483-P



MANHOLE FRAME FOR
DETAIL SEE SHEET 26

FOR DETAIL OF TRASH-
RACK ANGLES AND GRATING
SEE SHEET 18

TOP PLAN

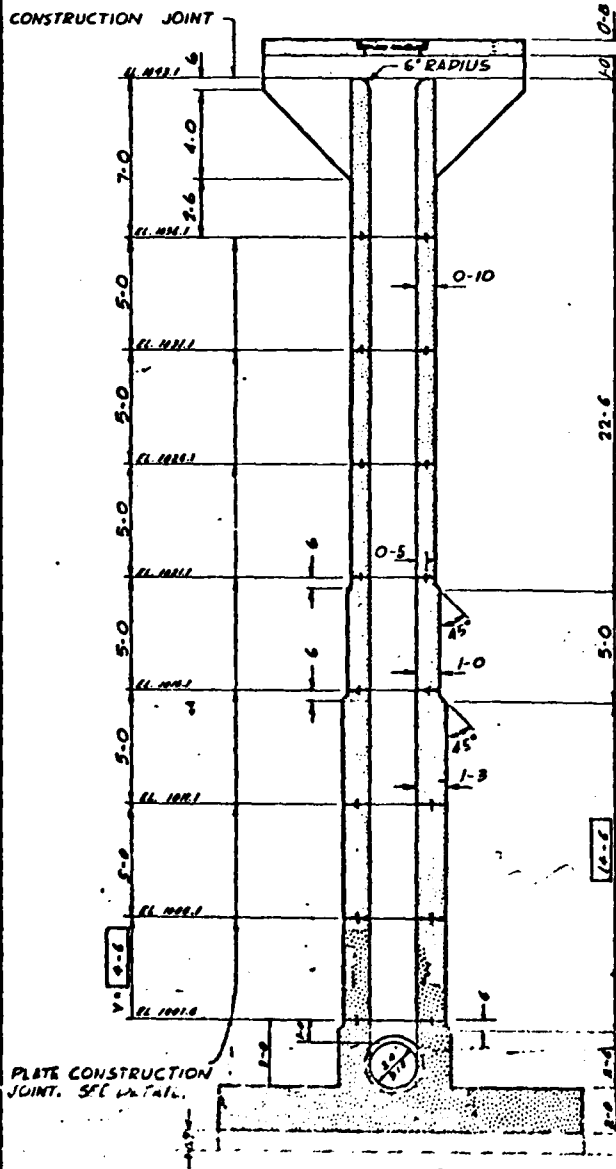


SPIGOT WALL FITTING FOR
DETAIL SEE SHEET 19

BELL RING WELL FITTING
DETAIL SHEET 26

SECTION A-A

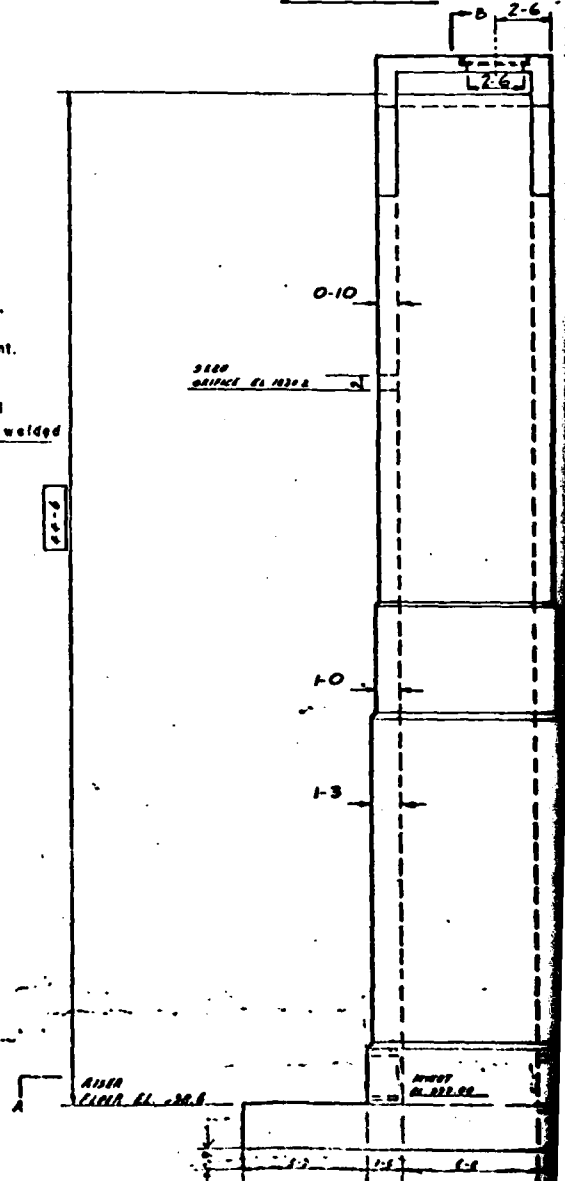
CONSTRUCTION JOINT



CONSTR. JOINT

- 1/4" x 6" Carbon steel plate,
to conform to Spec 581
Continuous thru constr joint.
Splices shall be either:
1. Butt welded
2. Lapped 3" and bolted
3. Lapped 3" and fillet welded

PLATE
CONSTR. JOINT

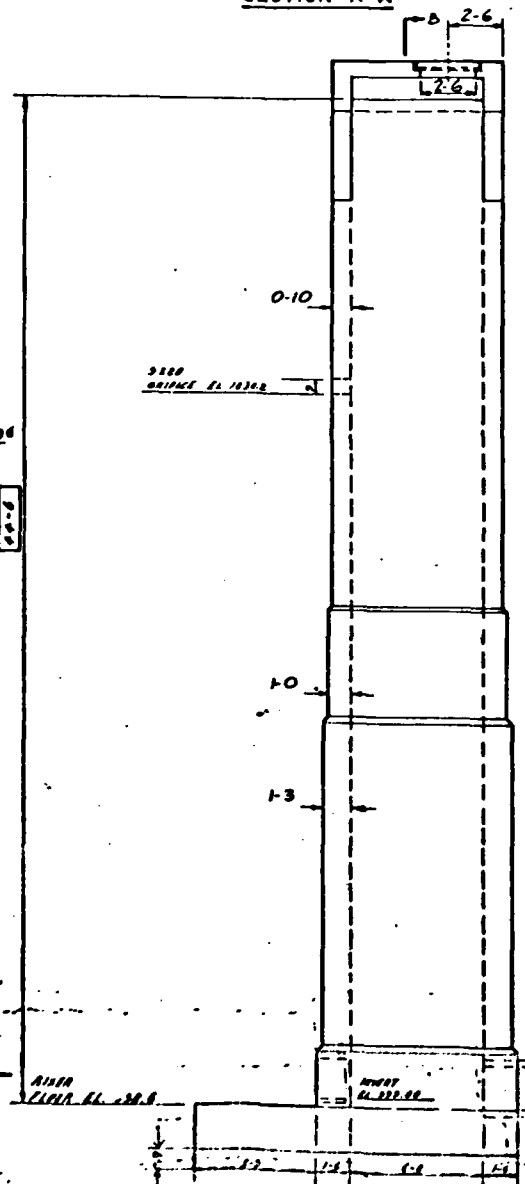


SIDEWALL ELEVATION
CONCRETE

STANDARD COVERED RISER			
DESIGN CONSTANTS	$f'_c = 4000 \text{ psi}$	$f'_c = 1500 \text{ psi}$	
	$n = 8$	$f_y = 20,000 \text{ psi}$	
STANDARD SPEC. NO.	ES-3024-4035E MODIFIED		
DATE	5-66	SHEET 1 OF 4	

NOT TO SCALE

SECTION A-A



SIDEWALL ELEVATION

CONCRETE • 52.37 • 0.97 V. • 58.7 CU. YDS.

[illegible]

QUANTITIES

PLATE 7

4 BARS 254-4
5 BARS 3604-6
6 BARS 2904-1
7 BARS 325-0
A BARS 847-1

3759 LBS.
4368 LBS.
707 : 35
22 : 50
11294 LBS.
11 : 100

HARMON CREEK WATERSHED

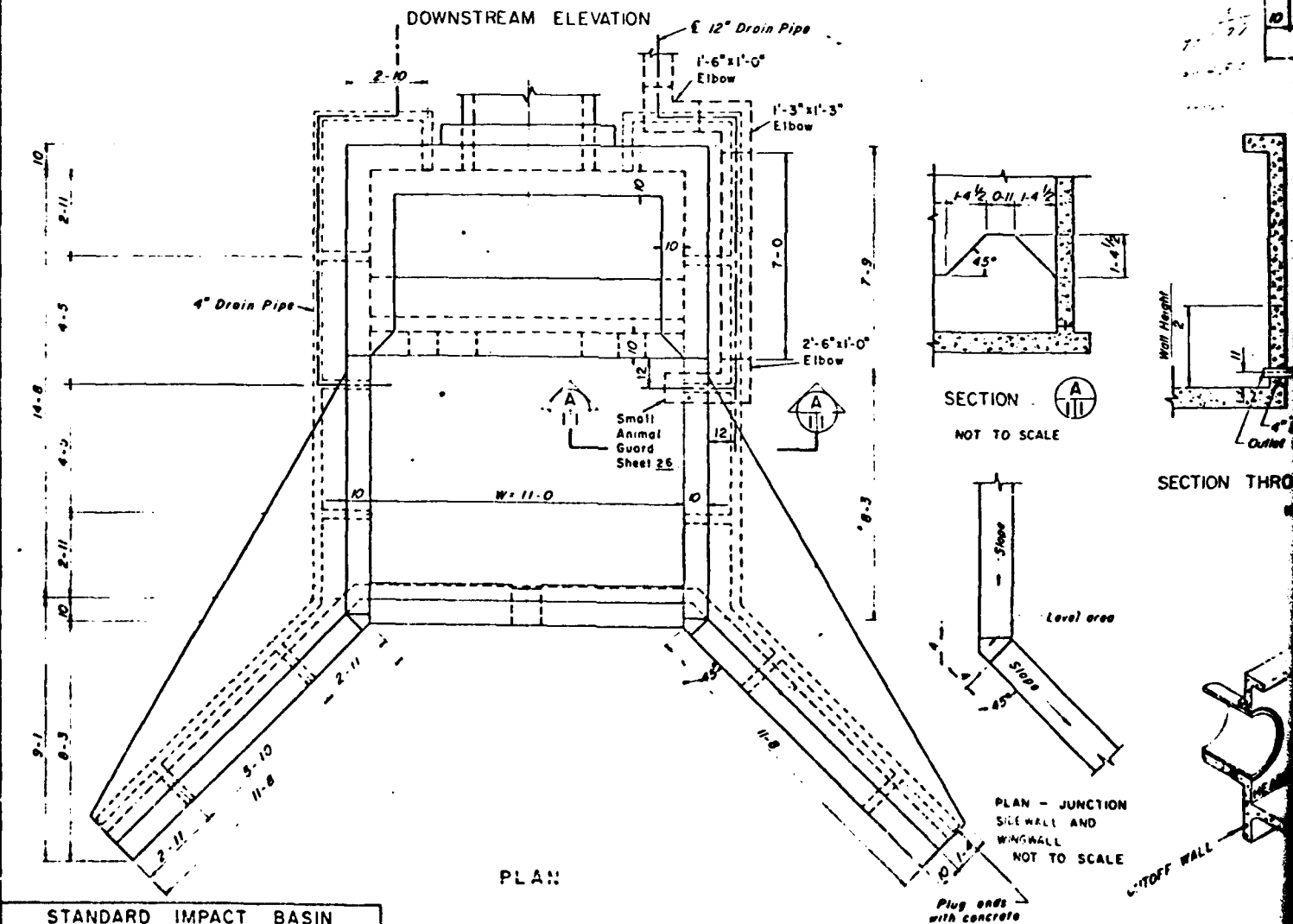
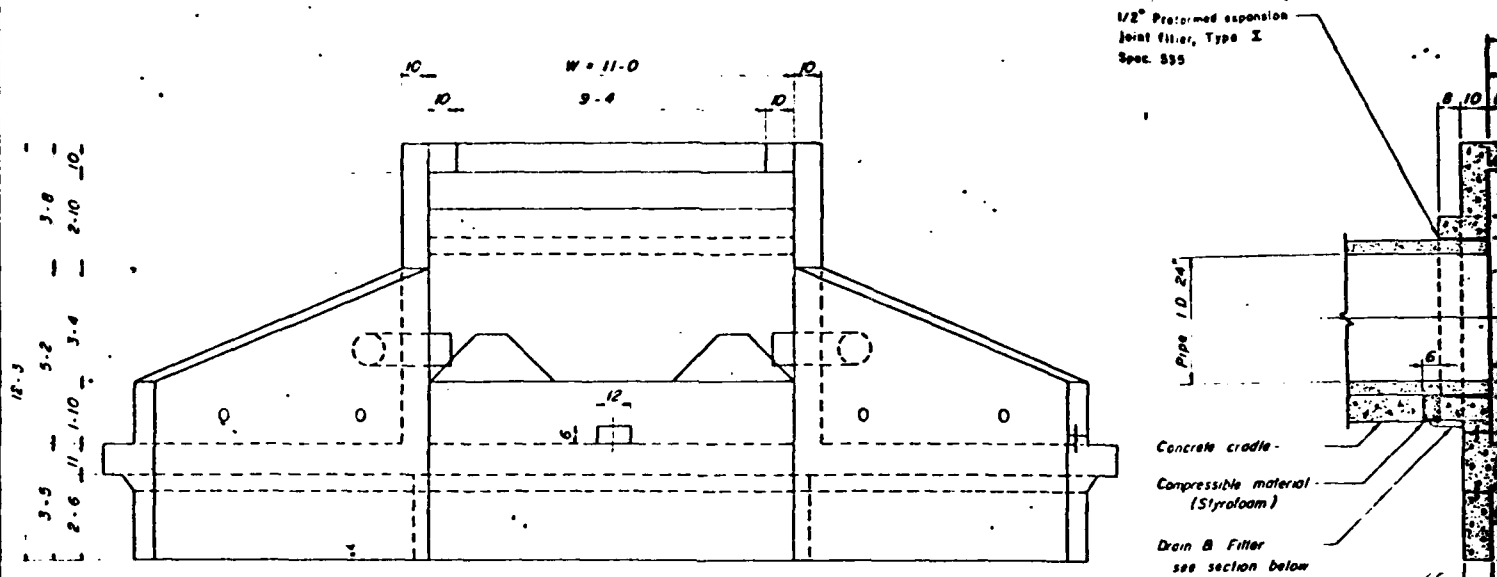
FLOODWATER RETARDING DAM 2-483
WASHINGTON COUNTY, PENNSYLVANIA

RISER STRUCTURAL DETAILS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

[illegible]

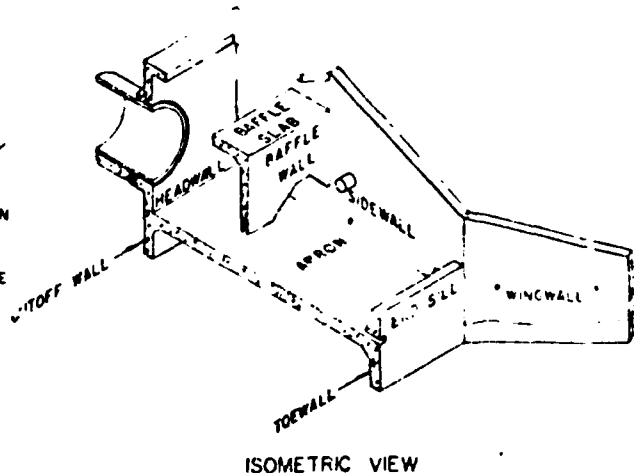
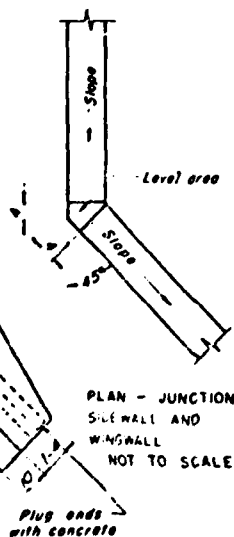
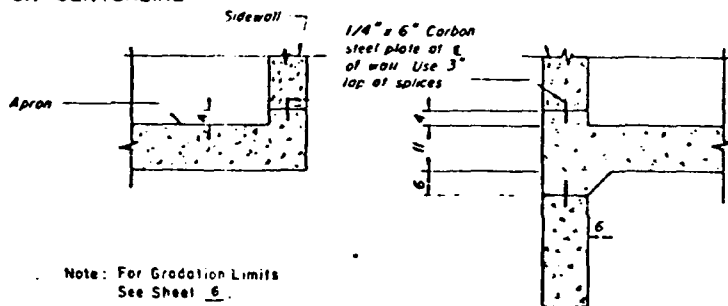
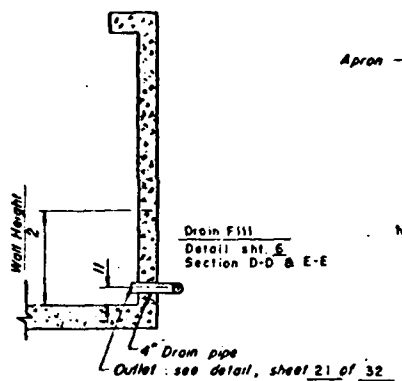
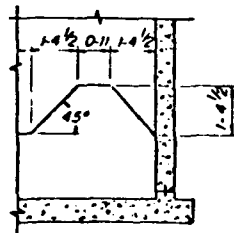
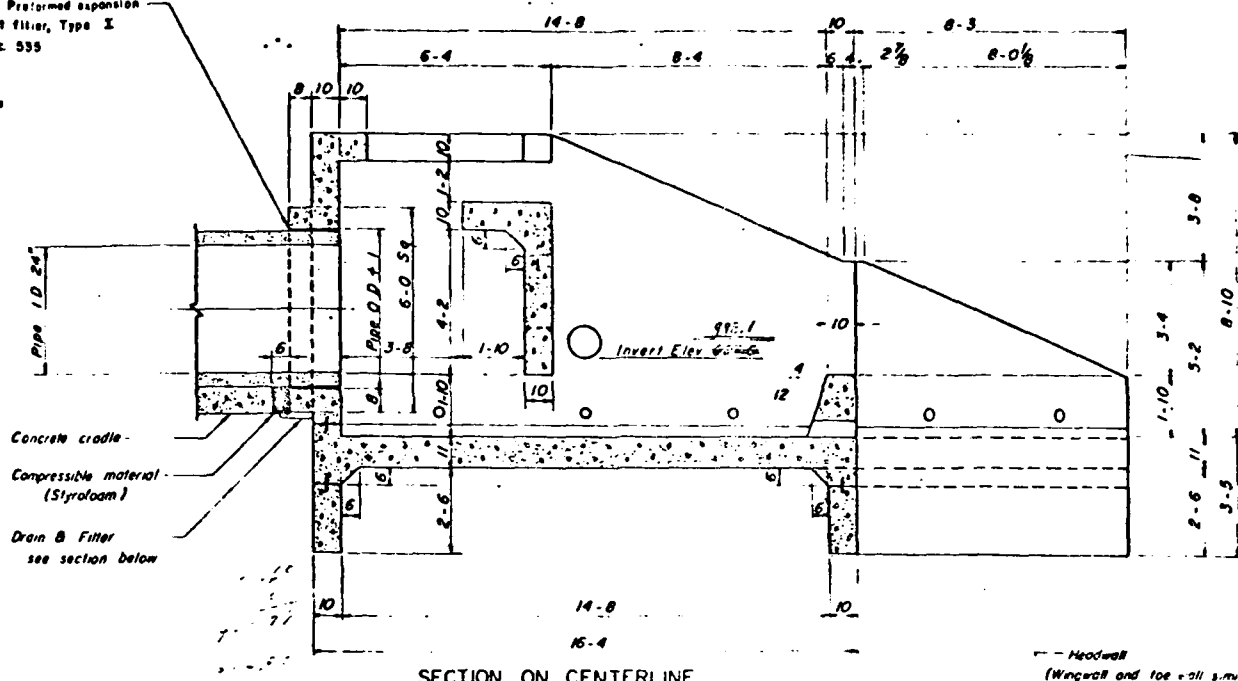
'AS BUILT' PLANS



STANDARD IMPACT BASIN			
DESIGN CONSTANTS	$f'_c = 4000 \text{ psi}$	$f'_c = 1600 \text{ psi}$	
	$n = 8$	$f_s = 20,000 \text{ psi}$	
STANDARD DRAWING NO	ES-4110		
DATE	1-7-11	SHEET	1 OF 5

CARL ROMDE
Consulting Engineer
554 Ridgeway Rd. Lake Oswego, Ore

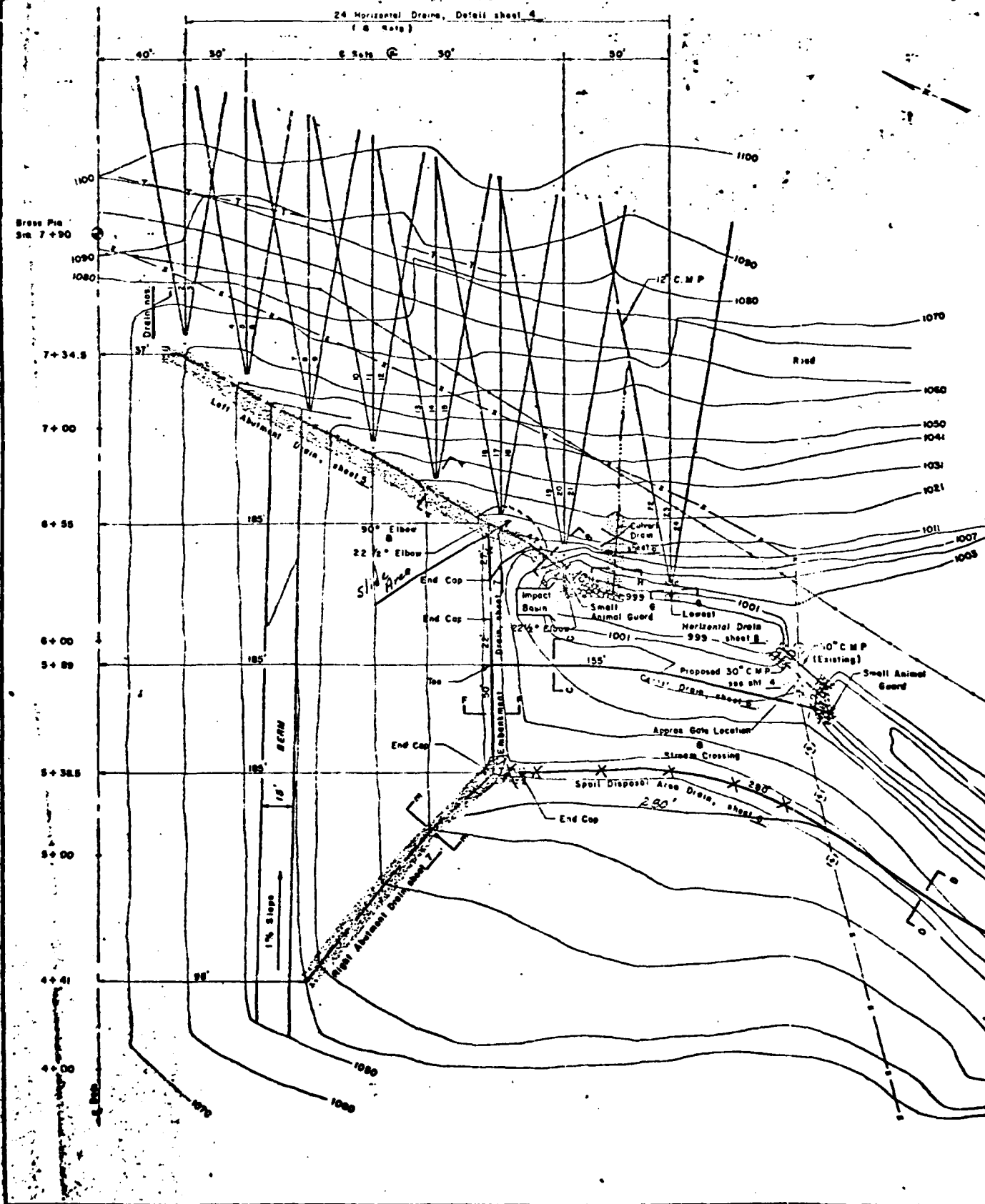
1 0 5
SCALE IN FEET
EXCEPT AS NOTED



QUANTITIES		
Formwork (Contact area)	1450	Sq Ft
Reinforced Concrete (Class 4000 Concrete)	33	Cu Yds
Reinforcing Steel	4800	Lbs
Drainage		
4" Perforated drain pipe (Spec 54% ASTM C-508)	70	Lin Ft
Animal screen detail, sheet 2 of 3	12	ea
Drain pipe tees	10	ea
Drain pipe 90° elbows	4	ea
Drain pipe 45° elbows	2	ea

Joints
1/4" x 6" Carbon steel plate, Structural grade 680 lbs

HARMON CREEK WATERSHED FLOODWATER PETARDING DAM P. 483 WASHINGTON COUNTY, PENNSYLVANIA IMPACT DAM DETAILS	
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
Drawn by _____ Date _____ Check _____ Title _____ Date _____ Drawing by _____ Date _____	PA-483-P



CONSTRUCTION NOTES

- 8" Dia. AC Drain Pipe shall be Type II, Class 150, Pressure Pipe. Const. Spec. 44.
- 8" Dia. CI Pipe shall conform to Const. Spec. 201. A 10' section of CI Drain Pipe shall be used at the outlet of each drain.
- 1 1/2" Dia. PVC Drain Pipe shall be Type II, Schedule 80, Plastic Pipe. Const. Spec. 411.
- 1 1/2" Dia. Steel Drain Pipe shall be galvanized, standard Pipe. Const. Spec. 52. A 10' section of Steel Pipe shall be used at the outlet of each horizontal drain.
- A Small Animal Guard for the 1 1/2" Dia. Steel Pipe shall be installed at the outlet of each horizontal drain.
- Length of all drain pipe includes fittings.
- Stream Crossing consists of twin 30" culverts - one existing and one proposed. Detail sheet 4.
- Embankment Drain, Center Drain and Spill Disposal Drain shall have 1' of Select Backfill Material. See sheets 6 and 7 for details.
- For details on Horizontal Drain numbering, elevation and depth see sheet 4.
- Rock spoils during dam construction in 1973 could be encountered during excavation of the Spill Disposal Area Drain. Amount and location of rock spoil is not known.
- Rock Gutters are located above the Left and Right Abutment Drains and at the outlet of Horizontal Drains 22, 23 and 24. Rock Riprap depth is 12".
- Rock Channel is located at the Culvert Drain only. Rock Riprap depth is 18".
- When construction operations necessitate work in the stream channel, the reservoir drain inlet gate shall be closed to minimize Erosion and Sedimentation, as directed by the Engineer.

QUANTITY SUMMARY

8" ASBESTOS CEMENT DRAIN PIPE (AC)

- 576' - 8" AC Drain Pipe, Perforated
Including: Cast Iron Fittings (Material Spec. 44)
1 - Tee
5 - 22 1/2" Elbow
1 - 90° Elbow
4 - End Caps

8" CAST IRON PIPE (CI)

- 30' - 8" CI Pipe
3 - Small Animal Guards, Detail sheet 4.

1 1/2" POLY VINYL CHLORIDE DRAIN PIPE

- 3428' - 1 1/2" PVC Drain Pipe, Perforated
Including: PVC Fittings (Const. Spec. 411)

1 1/2" STEEL PIPE

- 240' - 1 1/2" Steel Pipe
24 - Small Animal Guards, Detail sheet 4.

- For Sections: A - A & B - B see sheet 5.
C - C & D - D see sheet 6.
E - E & F - F see sheet 7.
G - G & H - H see sheet 8.

PLATE 10

LEGEND

- T — T Telephone
- F — F Fence
- P — P Power Line
- C.M.P. Corrugated Metal Pipe
- E — E Drain Trench
- Rock Gutter (See Const. Note 11)
- Rock Channel (See Const. Note 12)
- Fence to be removed and reinstalled
- 8" Drain Pipe & E Drain Trench

AS BUILT PLANS

0 10 20 30
SCALE IN FEET

EXHIBIT 10

HARMON CREEK WATERSHED
SUPPLEMENTAL DRAINAGE PA-483
WASHINGTON COUNTY, PENNSYLVANIA
DRAINAGE - PLAN VIEW

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Prepared by: W. E. Bolles
Checked by: L. Coffey, S. D.
Drawn by: S. B. Davis
PA-483

Inspector Russ Campbell

TYPICAL GROUT CROSS-SECTIONS (Not to Scale)

RIGHT ABUTMENT AND EMBANKMENT

Sta 2+04 to 4+55

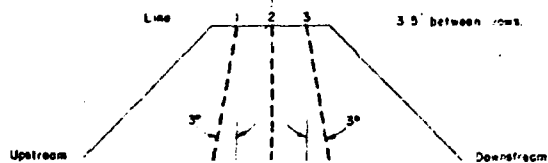
No 3" Deflection on Line 3 - Sta 3+50 - 4+55
Question of Drain location



EMBANKMENT

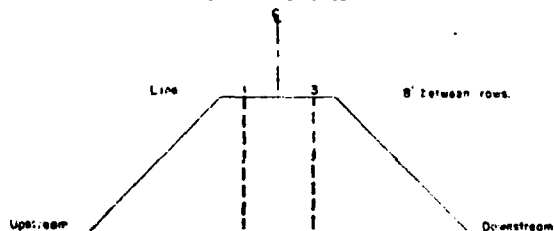
Sta 6+95 to 7+55

No Deflection - Line 3
Drain location



LEFT ABUTMENT

Sta 7+90 to 8+92



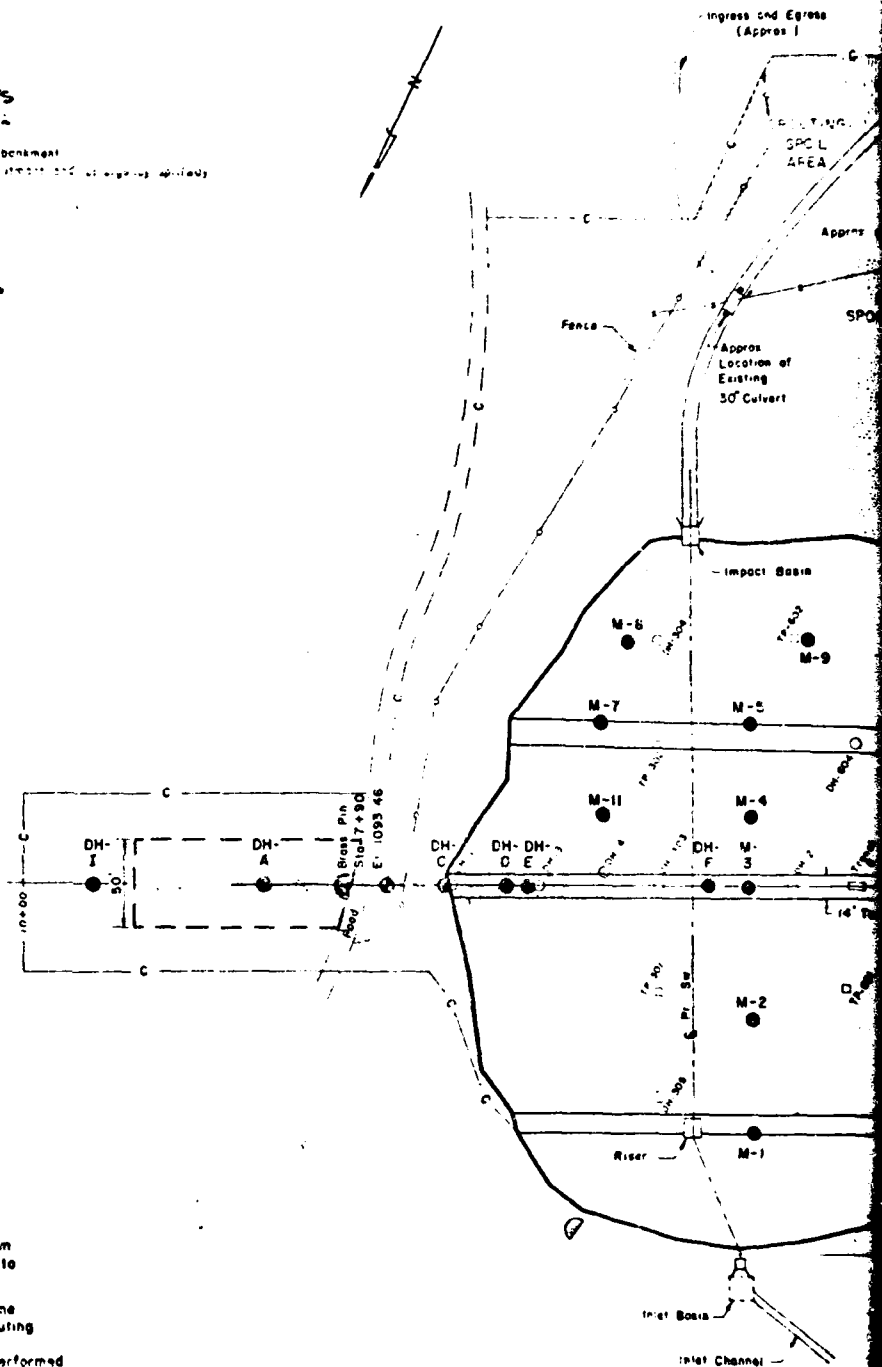
Line 1 - Upstream, Primary and Secondary Holes.

Line 2 - Centerline, Tertiary Holes.

Line 3 - Downstream, Primary and Secondary Holes.

CONSTRUCTION NOTES

1. All drill water and grout wastes will be directed upstream into a Sediment Basin. All disturbed areas will be held to the minimum required for work and equipment.
2. All primary holes shall be drilled and grouted first with Line 1 preceding Line 3. Drilling shall be separated from grouting operations at least 75' at all times. The secondary holes shall then be drilled and grouted. No drilling shall be performed within approximately 20' of a recently grouted hole for 24 hours after completion of grouting. The tertiary holes shall be drilled and grouted last.



SEDIMENT BASINS AS REQUIRED

Side slopes 2:1, Top width 5'-0", 6' long section of PennDOT Aggradation. Additional embankment as directed by the Engineer. Final location as directed by the Engineer. Sed Basins will be installed at each location prior to drilling.

6415- P/E Jan
 6410 - RP
 1005

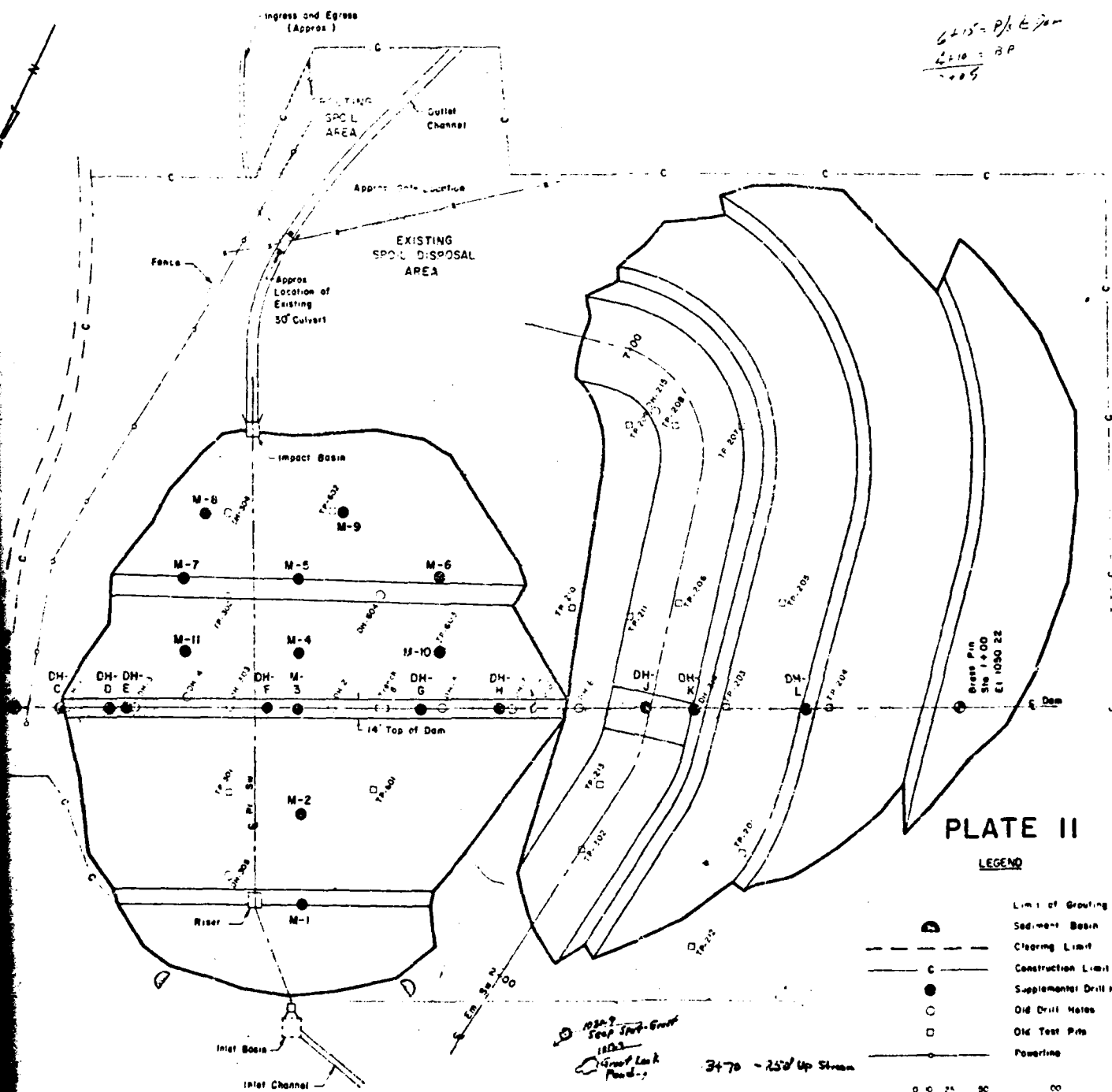


PLATE II

LEGEND

- Limit of Grouting (Approx.)
- Sediment Basin
- Clearing Limit
- Construction Limit
- Supplemental Drill Holes
- Old Drill Holes
- Old Test Pits
- Powerline

SEDIMENT BASINS

2 REQUIRED

Side slopes 2:1, Top width 5'-0", 6' long center section of PennDOT gradation. Add front earth embankment as called by the Engineer. Final grade and location as directed by the Engineer. Sediment Basins will be installed at each location prior to any drilling.

3470 - 250' Up Stream

0 0 25 50 100
 S.A.E. 1/2"

AS BUILT PLANS

HARMON CREEK WATERSHED
 FLOODWATER RETARDING DAM PA-483
 WASHINGTON COUNTY, PENNSYLVANIA

PLAN OF GROUTING

U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

Designed by W. B. Bales
 Drawn by S. G. Dyer
 Titled by [Signature]
 PA-483

APPENDIX F

REGIONAL GEOLOGY

REGIONAL GEOLOGY

The dam and reservoir are located in the Pittsburgh Section of the Appalachian Plateaus Physiographic Province. Bedrock units below the dam and at the abutments consist of the Casselman formation of the Conemaugh group. This formation consists of cyclic sequence of sandstone, shale, red beds, and thin limestone and coal. The majority of the abutments consists of the Morgantown sandstone member. The sandstone is primarily medium to coarse grained with some fine grained units. The sandstone is thin to medium bedded, micaceous, and cross-bedded. When slightly weathered, the sandstone is brown, moderately hard, and slightly permeable. When weathered, the sandstone is highly permeable and contains some fractures. On the right abutment this sandstone is fractured with joint openings up to 3 to 4 inches wide. Where measured, coefficients of permeability in this sandstone ranged between 22 and 175 feet per day. Siltstone underlies the sandstone. The siltstone is thin bedded, contains some thin clay strata, and is very soft to soft. In the foundation area, the sandstone/siltstone contact lies at or near the base of both abutments. The siltstone underlies the valley floor. Above the siltstone in the valley floor is highly stratified cobbly, gravelly, and sandy alluvium of recent origin.

The Pittsburgh coal lies approximately 130 feet above the top of dam and has been extensively strip mined in the area.

A regional geologic map and legend are presented on the following pages. Additional site geology can be obtained by reviewing the "Detailed Geologic Investigation Report" in the SCS design folder for this dam.



GEOLOGY MAP LEGEND

GROUP FORMATION

DESCRIPTION

Alluvium		Qt.	Sand, gravel, clay.
Terrace deposits			Sand, clay, gravel on terraces above present rivers; includes Carmichaels Formation.
DUNKARD	Greene		Cyclic sequences of sandstone, shale, red beds, thin limestones and coals.
	Washington	Pw	Cyclic sequences of sandstone, shale, limestone, and coal; contains Washington coal bed at base.
	Waynesburg		Cyclic sequences of sandstone, shale, limestone and coal; contains Waynesburg coal bed at base.
MONONGAHELA		Pm	Cyclic sequences of shale, limestone, sandstone and coal; contains Pittsburgh coal bed at base.
P: CONEMAUGH	Casselman	Pcc	Cyclic sequence of sandstone, shale, red beds and thin limestone and coal.
	Ames		
	Glenshaw	Pcg	Cyclic sequences of sandstone, shale, red beds and thin limestone and coal; several fossiliferous limestone; Ames limestone bed at top.
ALLEGHENY	Vanport	Pa	Cyclic sequences of shale, sandstone, limestone, and coal; contains Brookville coal at base and Upper Freeport coal at top; within group are the commercial Vanport limestone and Kittanning and Clarion coals.
		Pa	
POTTSVILLE			Sandstone and shale; contains some conglomerate and locally mineable coal.
Mauch Chunk			Red and green shale with some sandstone; contains Wymys Gap and Loyalhanna limestones.
Pocono			Sandstone and shale with Burgoon sandstone at top.